

Tennessee Department of Environment and Conservation

DOE Oversight Division



Status Report to the Public

Fiscal Year 2005

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The Tennessee Department of Environment and Conservation, Department of Energy Oversight Division, gratefully acknowledges the Oak Ridge Reservation Local Oversight Committee and the following individuals for their contributions to this report:

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Terms & Acronyms

ATSDR Agency for Toxic Substances and Disease Registry

BMAP Biological Monitoring and Abatement Program

BNFL British Nuclear Fuels LLC

CAP Citizens' Advisory Panel

CDC Centers for Disease Control and Prevention

CERCLA Comprehensive Environmental Response, Compensation, and Liability Act of 1980

D&D decontamination and decommissioning

DOE U.S. Department of Energy

EMWMF Environmental Management Waste Management Facility

EPA U.S. Environmental Protection Agency

ERAMS Environmental Radiation Ambient Monitoring System

ETTP East Tennessee Technology Park

FFA Federal Facility Agreement

FSP Facility Survey Program

FY fiscal year

HFIR High Flux Isotope Reactor

LOC Oak Ridge Reservation Local Oversight Committee, Inc.

MSRE Molten Salt Reactor Experiment

NEPA National Environmental Policy Act of 1969

NNSA National Nuclear Security Administration

NPDES National Pollutant Discharge Elimination System

ORNL Oak Ridge National Laboratory

ORR Oak Ridge Reservation

PCBs polychlorinated biphenyls

RCRA Resource Conservation and Recovery Act of 1976

REDC Radiochemical Engineering and Development Center

ROD Record of Decision

SNF spent nuclear fuel

SNS Spallation Neutron Source

SWSA Solid Waste Storage Area

TDEC Tennessee Department of Environment and Conservation

TEMA Tennessee Emergency Management Agency

TOA Tennessee Oversight Agreement

TRU transuranic

TSCA Toxic Substances Control Act of 1976

TVA Tennessee Valley Authority

UF₆ uranium hexafluoride

WIPP Waste Isolation Pilot Plant

Executive Summary

BACKGROUND

In 1942, construction began on enormous complexes across the nation created to support the Manhattan Project, a massive, top-secret effort during World War II to build the atomic bomb. The 35,545-acre Oak Ridge Reservation (ORR) in Tennessee remains as a legacy to the Manhattan Project and to the Cold War that followed. The ORR is currently owned by the U.S. Department of Energy (DOE), and approximately 15 percent of its total area is contaminated by hazardous and radioactive materials.

During World War II, four plants were built on the ORR to create materials for nuclear weapons; these plants were given the code names S-50, K-25, Y-12, and X-10. K-25, Y-12, and X-10 still exist as the East Tennessee Technology Park (ETTP), the Y-12 National Security Complex, and the Oak Ridge National Laboratory (ORNL). In the past decade, the missions of Y-12 and ORNL have continued to evolve, while ETTP has been targeted for cleanup and closure.

Over the last 60 years, DOE and agencies that preceded it contaminated more than 500 sites on or near the ORR. This legacy of contamination is being cleaned up to levels that comply with current environmental laws, particularly the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). Indeed, much of the DOE mission now centers on environmental management.

Over the last 60 years, DOE and agencies that preceded it contaminated more than 500 sites on or near the ORR.

SCOPE OF THIS STATUS REPORT

The Tennessee Department of Environment and Conservation (TDEC) DOE Oversight Division (“the division”) performs independent monitoring and oversight of DOE’s cleanup and waste-management actions. The division has performed this role since the Tennessee Oversight Agreement was signed in 1991.

This status report summarizes the state of Tennessee’s perspective on federal cleanup progress at the ORR. The results of state monitoring and analysis are also evaluated, as are the quality and effectiveness of DOE environmental monitoring and surveillance programs.

MAJOR FINDINGS

DOE has made tremendous progress under an accelerated cleanup plan worked out in 2002 among the state, DOE, and the U.S. Environmental Protection Agency. Complex projects have progressed smoothly at ETTP (e.g., decontamination of the K-33, K-31, and K-29 buildings) and ORNL (e.g., capping of burial grounds in Melton Valley). The shipment of uranium hexafluoride from ETTP to the Portsmouth Gaseous Diffusion

Executive Summary

Plant in Ohio has also proceeded without serious incident. In addition, DOE has made progress in correcting administrative failures that allowed two accidents in May 2004: a sodium fire at a company leasing space at ETTP, and a radioactive material spill on Hwy 95, west of ORNL.

DOE faces some daunting challenges, and it must put more effort into the appropriate disposal of radioactive waste and mixed waste (waste that has both radioactive and hazardous materials):

Cleanup of the ORR will leave it much less hazardous to people and the environment; nevertheless, continued maintenance, monitoring, and institutional controls will be required even after cleanup is completed.

KEY ISSUES AND CHALLENGES

The division has identified several areas of concern that DOE, regulatory agencies, and the community are still wrestling with. In many cases, there are no obvious solutions, and satisfactory resolution may be costly. These are listed below and detailed in Section 5:

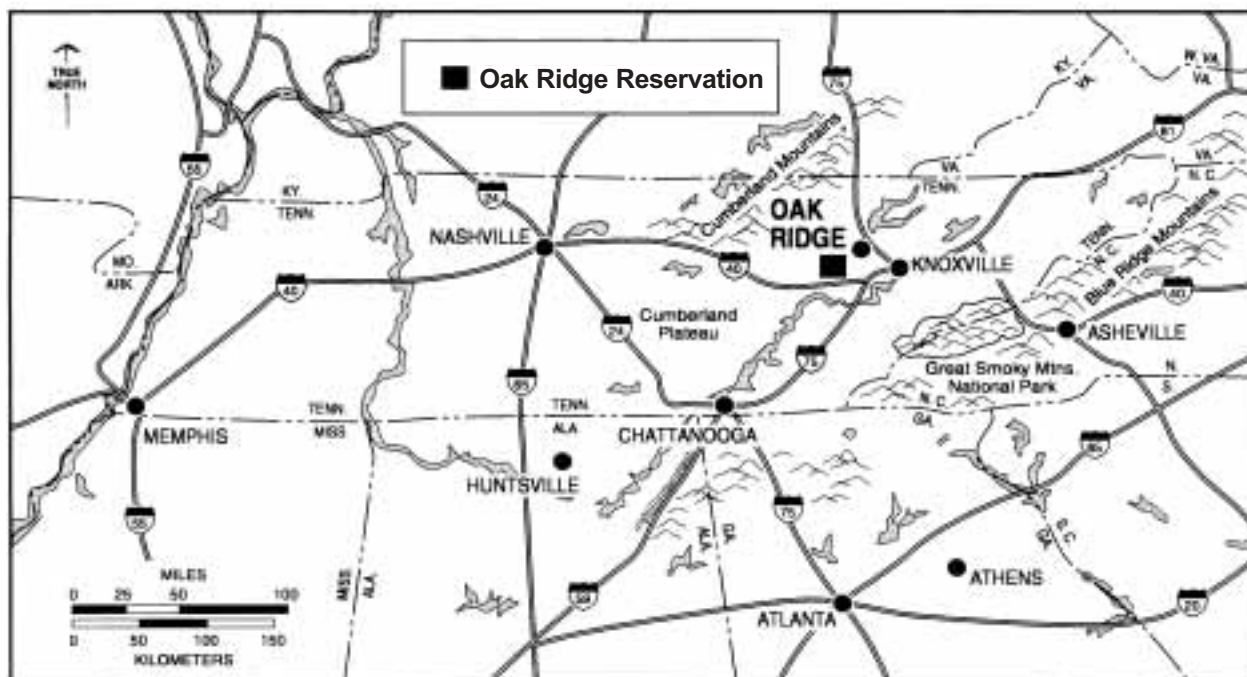
- Groundwater management strategies,
- Long-term stewardship responsibilities,
- The federal commitment,
- Characterization and disposal of radioactive waste,
- Incorporating historic preservation into cleanup activities,
- Emergency response preparedness, and
- Difficult cleanup decisions.

1.0 Introduction

1.1 HISTORY OF THE PROBLEM

Oak Ridge, Tennessee, was created to support the Manhattan Project, the secret World War II effort to develop the atomic bomb. The plants and town site were carved out of Appalachian valleys and ridges in 1942. After the end of the war, plant research and production supported the arms buildup associated with the Cold War. The U.S. Department of Energy (DOE) and its predecessor agencies left a legacy of buildings, lands, and streams contaminated by radioactive and hazardous wastes. Especially in the early years, toxic and radioactive materials washed down streams and were released into the air from government lands. Wastes were later placed in long-term storage, where much still remains and has yet to be properly tested and disposed.

Of the original four plants, three major industrial complexes remain on the Oak Ridge Reservation (ORR)—the Y-12 National Security Complex (formerly known as the Y-12 Plant), the East Tennessee Technology Park (ETTP, formerly known as the K-25 Site and as the Oak Ridge Gaseous Diffusion Plant), and the Oak Ridge National Laboratory (ORNL, formerly known as X-10). S-50, a thermal-separation uranium enrichment facility, was operated for about a year and dismantled when it proved inefficient. K-25 and Y-12 enriched uranium using more successful techniques, with K-25 using gaseous diffusion and Y-12 using electromagnetic separation. X-10 developed the technology to produce plutonium, which was then transferred to the Hanford Plant in Washington for full-scale production. During the Cold War, these facilities played a key role in



The Oak Ridge Reservation is located in East Tennessee. Map courtesy of U.S. Department of Energy (Oak Ridge Reservation Annual Site Environmental Report for 1998, DOE/ORO/2091).

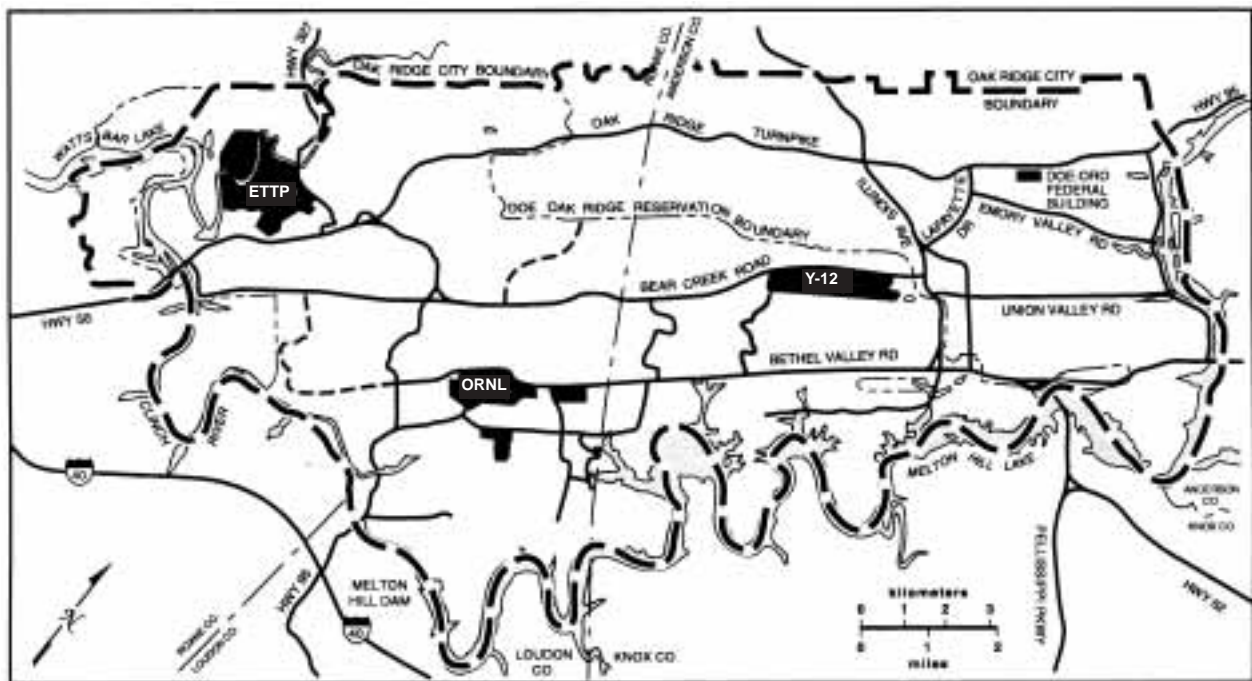
1.0 Introduction

managing materials and maintaining components for nuclear weapons and in preserving a technological lead over the Soviet Union.

Although the missions of these facilities have changed over the years, they continue to produce radioactive and hazardous wastes and to discharge small amounts of these substances into the environment. These activities are now regulated under federal and state laws and permits.

During World War II, Y-12 enriched uranium using an electromagnetic process; this process turned out to be relatively inefficient and was ultimately abandoned in favor of gaseous diffusion. Y-12 then became the center for precision machining of special nuclear materials for nuclear weapons. Y-12 now refurbishes and disassembles nuclear weapons and is the national repository for highly enriched uranium. It has also been designated the National Prototype Center in recognition of the unique expertise of its machinists.

K-25, the first gaseous diffusion plant, gave its name to the surrounding industrial complex. The complex ceased producing enriched uranium in the 1980s and refocused its mission on environmental management. Now known as Heritage Center at ETPP, its current goal is to transfer reusable buildings to the private sector, a process known as “reindustrialization.” Those facilities that are too contaminated to renovate will be demolished. After cleanup is complete, ETPP is to become the site for an industrial park. The Toxic Substances Control Act of 1976 (TSCA) Incinerator is also located at ETPP. This is the nation’s only facility permitted to incinerate radioactive waste mixed



The Oak Ridge Reservation lies about 20 miles west of Knoxville and straddles Roane and Anderson Counties. Map courtesy of U.S. Department of Energy (Oak Ridge Reservation Annual Site Environmental Report for 1998, DOE/ORO/2091).

1.0 Introduction

with hazardous waste containing polychlorinated biphenyls (PCBs), and it is key to cleanup of the ORR and other DOE sites. The TSCA Incinerator, previously scheduled for decommissioning in 2006, will now continue to operate beyond 2008 in order to support cleanup of other sites in DOE's national complex.

The X-10 plant originally pursued weapons research and development, and it piloted the purification technique for producing plutonium. Today, ORNL conducts research in a wide variety of scientific fields. It is famous for its contributions to neutron science and is the site of the Spallation Neutron Source (SNS), a major research facility nearing completion.

The story of Oak Ridge and details of the environmental damage caused by improper waste disposal are given in a community publication, *Oak Ridge, Tennessee: A Citizen's Guide to the Environment*. This publication can be downloaded from the following web sites: <<http://www.local-oversight.org/links.htm>> and <<http://www.oakridge.doe.gov/em/ssab/links.htm>>.

1.2 DIVISION OBJECTIVES

The Tennessee Department of Environment and Conservation (TDEC) formed a DOE Oversight Division ("the division") in 1991 under the Tennessee Oversight Agreement (TOA). The division pursues five primary objectives:

- To monitor and ensure DOE's compliance with applicable laws, regulations, Oak Ridge Federal Facility Agreement (FFA) provisions, the TOA, DOE Orders, administrative policies, approved procedures, and appropriate guidelines;
- To evaluate the effectiveness of radiological controls implemented on the ORR by DOE and its contractors;
- To characterize and identify radiological and hazardous contaminants—as well as pathways for the off-site spread of these contaminants—on the ORR and surrounding areas and to determine the potential impact of DOE activities on the welfare of Tennessee's citizens and environment;
- To support DOE in employing the corrective measures necessary to provide a healthful environment for citizens of the state; and
- To monitor contaminant releases in case of an emergency and provide requested services to the Tennessee Emergency Management Agency (TEMA) as described in its Multi-Jurisdictional Emergency Response Plan for the ORR.

The results of these activities and the current status of environmental health on the ORR are summarized in this report.

2.0 Jurisdiction

2.1 TENNESSEE OVERSIGHT AGREEMENT AND THE DOE OVERSIGHT DIVISION

The state and DOE signed the TOA in 1991, and TDEC created the division the same year to carry out its responsibilities under the agreement. The TOA provides a framework and funding for the state to oversee DOE's effects on the community with four related programs:

- A regulatory program to support state participation in the FFA (see Section 2.2);
- A non-regulatory program of independent environmental monitoring and oversight to supplement activities conducted under applicable environmental laws and regulations;
- An emergency response program to help ensure that the state and local communities are prepared in case DOE creates an off-site emergency; and
- An outreach program to increase public awareness and involvement by citizens and local governments in DOE's Oak Ridge operations.

2.2 FEDERAL FACILITY AGREEMENT

The state, DOE, and the U.S. Environmental Protection Agency (EPA) ratified the FFA in 1992. It provides a legal framework allowing the division to enforce DOE cleanup of contamination from past ORR activities. Oak Ridge has an FFA because the ORR is listed on the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) National Priorities List.

The division coordinates state activities under the FFA. The agreement itself outlines a procedure for cleanup on the ORR, including the identification of problems and scheduling, implementation, and monitoring of appropriate responses. Actions taken under the FFA conform to CERCLA, the Resource Conservation and Recovery Act of 1976 (RCRA), and other federal and state laws.

CERCLA documents related to cleanup decisions on the ORR are available for the public to review at DOE's Information Center (see Section 7.4.4).

2.3 NATIONAL ENVIRONMENTAL POLICY ACT

The National Environmental Policy Act of 1969 (NEPA) applies to proposed federal actions that could significantly affect the human environment, requiring federal agencies to consider environmental impacts and provide for public review and comment. Although NEPA reviews are not required for projects performed under CERCLA, DOE is required to incorporate NEPA values (i.e., consideration of public input on potential impacts to the environment) into CERCLA actions.

2.0 Jurisdiction

NEPA requires federal agencies to ensure that citizen participation and environmental impacts are properly factored into the agency's decision-making.

The division commented on the following NEPA documents in fiscal year (FY) 2005:

- *Environmental Assessment for the U-233 Disposition, Medical Isotope Production, and Building 3019 Complex Shutdown at the Oak Ridge National Laboratory, Oak Ridge, Tennessee*, DOE/EA-1488. This document evaluates the processing of uranium-233 stored at ORNL and other small quantities of similar material currently stored at other DOE sites in order to render it suitable for safe, long-term, economical storage.
- *Final Environmental Assessment for the Alternate Financed Facility Modernization*, DOE-EA-1510. This proposed action would transfer two parcels of real estate at Y-12, under section 161 (g) of the Atomic Energy Act, to a private development corporation.
- *National Environmental Policy Act Environmental Assessment for the Transportation of Unirradiated Uranium in Test Reactor Fuel from Argentina, Austria, Japan, and the Republic of Korea to the Y-12 National Security Complex*, Official Use Only document. This proposed action would remove orphaned or vulnerable nuclear materials from foreign sites.

NEPA requires decisions to be made through a sustained process of inquiry, analysis, and learning. It ensures that federal agencies provide the public an opportunity to learn about and comment on significant proposals. When followed as required, it ensures adequate planning and prevents costly mistakes.

NEPA documents related to federal decisions affecting the ORR are available for the public to review at DOE's Information Center (see Section 7.4.4).

When followed as required, NEPA ensures adequate planning and prevents costly mistakes.

2.4 OTHER PLANNING AND POLICY ISSUES

The division also reviewed and commented on the following documents:

- *Depleted Uranium Hexafluoride Conversion Project Waste Management Plan* (DUF6-UDS-PLN-005, Rev. F). The plan described the management of wastes generated during operation of the conversion plants and during cylinder surveillance and maintenance activities at the Paducah, Kentucky, and Portsmouth, Ohio, sites.
- *Annual Report Calendar Year 2003, Implementation of Mitigation Action Plan for Lease of Land Parcel ED-1 on the Oak Ridge Reservation, Oak Ridge, Tennessee*. This document focused on DOE's plan to lease the 957-acre parcel ED-1 at ETTP to the Community Reuse Organization of East Tennessee. It resulted in a Finding Of No

2.0 Jurisdiction

ENVIRONMENTAL LAWS

Comprehensive Environmental Response, Compensation, and Liability Act of 1980

Commonly known as “Superfund,” the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) was enacted in 1980. It establishes a trust fund for cleaning up abandoned or uncontrolled hazardous waste sites. It also sets up rules governing these sites and holding those responsible for the contamination liable.

CERCLA lays out the steps through which the U.S. Department of Energy (DOE) must proceed in cleanup planning under its environmental restoration program. The “CERCLA process” guides DOE through seven clearly defined steps:

- Planning,
- Investigation,
- Feasibility analysis,
- Development of alternatives,
- Public participation,
- Selection of alternatives, and
- Creation of a final, legal decision embodied in a document known as a Record of Decision (ROD).

The ROD is a key milestone in CERCLA decisions because it establishes the legal and technical requirements for a given cleanup. Once the state and U.S. Environmental Protection Agency (EPA) have signed a ROD, DOE is responsible for carrying out the actions outlined in the document. The ROD and cleanup actions taken under it are designed to ensure that all unacceptable risks to human health and the environment are eliminated or controlled as much as possible.

The state is responsible under the Oak Ridge Federal Facility Agreement (FFA) for coordinating, reviewing, commenting on, and approving each phase of the CERCLA cleanup. The phases include remedial investigations, feasibility studies, RODs, remedial designs, remedial actions, and follow-up evaluations. These phases are present to ensure success of the cleanup. The FFA involves the state directly in program management, dispute resolution, project prioritization, and milestone scheduling.

Resource Conservation and Recovery Act of 1976

This law gives EPA authority to control hazardous waste from “cradle to grave.” It covers the generation, transportation, treatment, storage, and disposal of hazardous waste. It also

Continued on next page

2.0 Jurisdiction

Continued from previous page

provides a framework for managing non-hazardous wastes. The Resource Conservation and Recovery Act of 1976 (RCRA) focuses only on active and future facilities.

DOE's waste management program must answer to the state under RCRA. The division does not enforce RCRA regulations, but it can and does document violations, which are then pursued by the Tennessee Department of Environment and Conservation's Division of Solid Waste Management.

National Environmental Policy Act of 1969

The National Environmental Policy Act of 1969 (NEPA) is the overall national charter for protection of the environment. It establishes policy, sets goals, and provides means for carrying out the policy. NEPA requires DOE and other federal agencies to provide public officials and citizens with environmental information regarding proposed federal actions that could affect the quality of the environment. With regard to major decisions regarding CERCLA activities, DOE has incorporated "NEPA values," including public participation and broad assessment of possible impacts. The division's NEPA program reviews NEPA documents that pertain to DOE activities on the Oak Ridge Reservation (ORR).

Natural Resources Damage Assessment

The division also participates in Natural Resources Damage Assessment activities. Federal law authorizes this program, which gives natural resource trustees at the state and federal level a means of recovering environmental damages caused by releases from CERCLA sites. Specifically, the program is intended to address damages that cannot be effectively corrected through cleanup.

Other Laws

Other laws applicable to environmental management at the ORR include the following:

- Clean Air Act (1970),
- Clean Water Act (1977),
- Emergency Planning and Community Right-to-Know Act (1986),
- Federal Hazardous Substance Act (1966),
- Federal Facility Compliance Act (1992),
- Safe Dam Act (1973),
- Safe Drinking Water Act (1974),
- Solid Waste Disposal Act (1965), and
- Toxic Substances Control Act (1976).

2.0 Jurisdiction

Significant Impact conditioned upon an annual report by DOE of the sensitive areas of ED-1

2.5 NATURAL RESOURCE DAMAGE ASSESSMENT

In March 2005, the state and DOE finalized an agreement to set aside approximately 3,000 acres on portions of Blackoak Ridge and McKinny Ridge near ETP. This conservation easement is a partial response to natural resource injuries caused to Watts Bar Reservoir as result of contaminant releases from the ORR. The easement will be managed by the state; it will provide natural resource management opportunities as well as low-impact recreational opportunities.



TDEC photo

At the Y-12 Surplus Material Yard, division personnel monitor the material being sold as surplus to ensure that no contamination leaves the site.

3.0 Environmental Management

3.1 RECENT PROGRESS

3.1.1 Environmental Restoration

CERCLA-driven environmental cleanup at the ORR is proceeding rapidly. Based on the Accelerated Cleanup Plan, most remedial action is focused within ORNL's Melton Valley Watershed and at ETTP. However, other activities continue throughout the ORR.

In Melton Valley, work is under way to complete capping of Solid Waste Storage Areas (SWSAs) 4, 5, 6, and 7. In addition, several buildings have been removed, monitoring wells have been plugged, and contaminated soils have been excavated and disposed. Field work continues to remove, treat, and dispose of the transuranic (TRU) waste within the 22 trenches in the SWSA 5 North portion of Melton Valley.

At ETTP, work in Zone 1 (which contains property along the Clinch River, including the former power plant area) included completion of the Blair Road Quarry remedial action, initiation of the removal of scrap at the K-770 Scrapyard, and dynamic verification of the outlying areas in Zone 1. The Zone 2 Record of Decision (ROD) was signed in April 2005 and focuses on the contaminated soil, buried waste, and subsurface structures in the main plant area of ETTP. Field work to support a sitewide ROD for groundwater, surface water, sediment, and ecological risk due to soil exposure is currently ongoing.

In Bethel Valley at ORNL, sampling was completed for a groundwater engineering study. Results are currently being evaluated and will be published in a report. This will give valuable information on the soil areas within the watershed that need remediation. Also, cleanup had begun on the Hot Storage Garden site, a former underground storage facility for spent nuclear fuel assemblies and other irradiated material. Notably, four workers were contaminated with residual radioactivity in September 2004, which caused suspension of work.

At Y-12, a proposed plan for interim actions addressing contaminated soil and sediment at Upper East Fork Poplar Creek went out for public comment in April and will lead to a ROD in 2006.



Bechtel Jacobs Company LLC photo
SWSA 4 remediation was completed in November 2004.

“Dynamic Verification” is a systematic method of testing to be sure that an area has been properly decontaminated or cleaned up, using real-time measurements as work is completed.

3.0 Environmental Management

3.1.2 Accelerated Cleanup Plan

The Oak Ridge Accelerated Cleanup Plan, which was agreed upon by the state, DOE and EPA in June 2002, is now under way. The plan shortens cleanup times throughout the reservation, with cleanup at ETTP to be complete in 2008, interim cleanup of Melton Valley to be complete in 2006, and the disposal of all low-level legacy waste to be complete in 2005. It was put in place primarily to reduce long-term cost and to expedite remediation of the most contaminated sites on the ORR.

The Melton Valley portion of the plan is actually ahead of schedule, and the state anticipates work will be completed in 2006 as planned.

Much progress has been made after 2 1/2 years of work. The Melton Valley portion of the plan is actually ahead of schedule, and the state anticipates work will be completed in 2006 as planned. The ETTP closure project is also well under way. However, due to the overall complexity of the project and some unforeseen difficulties, the project is now projected to be approximately 3 months behind schedule. With more than 2 years remaining on the projected 2008 finish, it may be possible to recover schedule and complete the closure of ETTP as planned. At this time, the state sees no major problems that would preclude the successful completion of the remedial action portion of the accelerated cleanup plan.

DOE is also on the path to meeting the legacy low-level waste disposition goal. As of June 30, 2005, characterization activities have been completed for approximately 98 percent of the volume of waste in inventory, and approximately 82 percent of the waste has been disposed.

Melton Valley Interim Record of Decision. The Melton Valley Interim ROD includes most of the sites grouped in the Melton Valley portion of White Oak Creek Watershed and a few projects from Bethel Valley (Section 3.2.2).

East Tennessee Technology Park Closure Project. The ETTP Closure Project has concentrated on extensive decontamination and decommissioning (D&D) of the massive gaseous diffusion buildings and their support facilities, allowing cleanup of underlying soils. All actions within the ETTP Watershed (Section 3.4) are part of this project.

Balance of Program. The Balance of Program includes remediation at Y-12 (see Section 3.3), which encompasses both the Upper East Fork Poplar Creek and Bear Creek Valley watersheds. It also includes actions at ORNL (Section 3.2) in the Bethel Valley portion of White Oak Creek Watershed, off-site closures at sites in Oak Ridge and Knoxville, and waste management activities (Section 3.5).

3.0 Environmental Management

3.2 OAK RIDGE NATIONAL LABORATORY

3.2.1 White Oak Creek Watershed—Bethel Valley

The 800-acre Bethel Valley Watershed contains the main plant area of ORNL. The watershed is bounded to the south by the White Oak Creek Watershed—Melton Valley and to the north by the Bear Creek Valley Watershed.

This watershed contains the area previously known as Waste Area Grouping 1: industrial buildings, laboratories, research reactors, and support facilities such as tank systems, pipelines, and other ancillary equipment. The wastes located in the Bethel Valley portion of the watershed came from operations such as the following:

- Nuclear reactors;
- Radioisotope operations;
- Particle accelerators;
- Hot cell operations;
- Physical, chemical, and biological research;
- Fuel chemical reprocessing research; and
- Analytical laboratories.

Bethel Valley Watershed also contains the Waste Area Grouping 3 burial grounds to the west and the Waste Area Grouping 17 shop area. Waste Area Groupings 3 and 17 are not as seriously contaminated as other areas but still must be closed out.

Bethel Valley Interim Record of Decision. The Bethel Valley Interim ROD covers cleanup of surface water, soils, buildings, and contaminated source areas while deferring decisions on groundwater. It was completed and signed by the FFA parties in May 2002. The signing was a milestone and began several years of CERCLA remediation within the Bethel Valley Watershed.

Molten Salt Reactor Experiment. The Molten Salt Reactor Experiment (MSRE) operated from 1965 to 1969, after which it was mothballed. The remediation and closure of the MSRE facility was begun in late FY 1994 and is still under way. This activity, authorized under a CERCLA ROD, involves the removal and disposition of reactor fuels (solidified salts of beryllium fluoride, lithium fluoride, zirconium fluoride, uranium fluoride, and trace quantities of other fluoride compounds). This material is currently scheduled for removal by the end of FY 2006.

The following MSRE activities, overseen by the division's Environmental Restoration and Radiological Monitoring and Oversight programs, took place in FY 2005.

Reactive Gas Removal. The Reactive Gas Removal System became operational in FY 1997. The system purges uranium hexafluoride (UF₆) and fluorine gas from the off-gas piping system. To date, the Reactive Gas Removal System has removed more than 23 kg of MSRE uranium in the form of UF₆. It will remain operational for the duration of the MSRE remediation project. Only very small amounts of UF₆ were removed from the system during FY 2005.

3.0 Environmental Management

Uranium Deposit Removal. The uranium deposit—containing approximately 2.7 kg of uranium-233—was removed from the auxiliary charcoal filter bed in FY 2001. The removal action report for this activity was completed and approved in FY 2002. The uranium-embedded charcoal deposit is currently being stored in a safe-geometry configuration in a shielded canister on top of the MSRE reactor shield blocks in the reactor high bay.

Fuel and Flush Salt Removal. In this remedial action, uranium is separated and removed from the fuel and flush salts in the drain tanks and stored as part of the uranium-233 inventory. The fuel and flush salts are later removed from the drain tanks and placed in stable storage. Fuel and flush salt removal began in FY 2005 and is scheduled for completion in FY 2006. Following fluorination for removal of the uranium as UF₆, the uranium-233 will be placed in interim storage at ORNL Building 3019 and dispositioned with the rest of the uranium-233 material. An MSRE Phased Construction Completion Report is planned for completion in FY 2006.

ORNL Corehole 8 Source Removal. This site is a plume of groundwater contaminated with strontium-90. The contamination can be traced back to highly contaminated soils and a leaking liquid low-level radioactive waste tank located in the main ORNL plant area. After excavating approximately 90 percent of the contaminated soil around leaking underground waste tank W-1A, DOE discontinued the excavation when it encountered higher-than-anticipated levels of TRU radionuclides. The state and EPA are allowing DOE to rethink the excavation and disposal process and then expediently continue with the removal of this high-risk source. DOE has agreed to resume and complete this removal activity in FY 2007.

Spallation Neutron Source. The SNS is an accelerator-based research facility being built on a 75-acre site on Chestnut Ridge between ORNL and Y-12. Construction of the \$1.4 billion facility began in December 1999, and it is scheduled for completion in

***The Spallation
Neutron Source is
approximately 92
percent complete, and
the design is 100
percent complete.***

2006. The project is approximately 92 percent complete, and the design is 100 percent complete. The facility (as designed) will have 24 beam lines directing neutrons toward test material. Project planners expect to host 2000 researchers/users per year when the project is complete. The facility is not yet operational, but limited testing is being conducted on equipment as it is installed. The facility is scheduled to begin operation in June 2006. By around 2007–2008, the SNS is expected to generate the most intense neutron flux of any facility in the world. The SNS project should be complete in April 2006. An addition to the SNS, the Power Upgrade Project, has received a signed approval of

need. The Power Upgrade Project is expected to cost \$120 million to \$160 million, with construction scheduled to begin in October 2006 and project completion scheduled for March 2011. Site roads, boundaries, and security have been turned over to ORNL.

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The division attends semiannual DOE review sessions, has periodic meetings with SNS staff members, makes site visits (including inspections of erosion and sediment controls), and reviews documents. Currently, division staff members are awaiting a waste management plan and an environmental monitoring plan for comment and review. Staff reviewed the SNS groundwater monitoring plan in 2005.

3.2.2 White Oak Creek Watershed—Melton Valley

The Melton Valley Watershed occupies about 1,000 acres of land south of and downstream of the Bethel Valley Watershed. Haw Ridge separates Melton Valley from Bethel Valley, and the Clinch River borders Melton Valley on the west.

Melton Valley contains many acres of burial grounds, seepage pits, contaminated floodplains, and hydrofracture wastes, but most disposal activities involved the use of shallow land burial. The wastes located in this watershed originated not only from local operations, but from other sites as well. Beginning in the mid-1950s, the Atomic Energy Commission designated ORNL's solid waste storage areas as the Southern Regional Burial Grounds. From 1955 to 1963, various off-site installations sent about 10 million cubic feet of solid waste containing radioactive and hazardous substances to be disposed in this area.

The Melton Valley Watershed has many problem contaminants, some of which are discharging into the Clinch River via White Oak Creek. These include cesium-137, cobalt-60, strontium-90, tritium, other radionuclides, TRU elements, and volatile organic compounds.

Melton Valley Watershed Interim Record of Decision. The Melton Valley Interim ROD was completed and signed by the FFA parties in September 2000. This CERCLA decision combines many independent subunits—or operable units—that involve soil excavations, the capping of waste disposal sites, demolition of old facilities, and the plugging and abandonment of numerous monitoring and hydrofracture wells. Remedial actions to be performed under this ROD are scheduled under the Accelerated Cleanup Plan to be completed in FY 2006. Several of the initial activities under this ROD were completed this past year, and new activities continue.

Hydrologic Isolation. The Melton Valley Interim ROD includes the installation of multi-layer caps on areas that have been used to bury radioactive waste over the past half century. During FY 2005, DOE has completed cap installation on SWSA 4 and SWSA 7. The installation of caps on SWSA 5 and SWSA 6 should be completed in FY 2006. Shallow groundwater diversion and collection trenches are also being installed in the capped areas.

Soils and Sediments. DOE performed walkover surveys in most of Melton Valley during FY 2005. The project has identified locations where soil contamination may exceed the cleanup criteria described in the ROD. Some of these areas include leak sites from inactive pipelines, soils in the immediate vicinity of inactive settling ponds, and

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soils under equipment storage areas. This project is scheduled to be complete in FY 2006.

New Hydrofracture Facility D&D. This project, part of the Melton Valley Interim ROD, involves D&D of the New Hydrofracture building and support systems. An off-site contamination incident that resulted in the repaving of Highway 95 has delayed this project for several months. In response, DOE has initiated a new management approach for this project and gone through a lengthy “lessons learned” process and readiness assessment. Demolition of the facility should be complete during FY 2006. Contaminated waste from this project is planned for disposal at the Environmental Management Waste Management Facility (EMWMF), which is located in Bear Creek Valley to dispose waste created by cleanup on the ORR.



Division personnel measure radiation during a facility demolition visit at ORNL.

TDEC photo

Plugging of Abandoned Monitoring Wells. The 111 wells at the four hydrofracture sites in Melton Valley were plugged and abandoned in 2003 and 2004.

High Flux Isotope Reactor and Radiochemical Engineering and Development Center. The High Flux Isotope Reactor (HFIR) and Radiochemical Engineering and Development Center (REDC) are active facilities. They are used for research into the interaction between neutrons and various materials, and for producing medical and industrial isotopes. Targets that have been irradiated at HFIR are sent to REDC for isotope separation and subsequent packaging for shipment to the end user.

In spring 2001, the division formed a HFIR/REDC Review Team to increase state oversight of these facilities. For FY 2005, the team undertook the following activities:

- Monitored progress of HFIR upgrades (ongoing from previous years);
- Conducted field trips for general overview of the HFIR and REDC facilities;
- Reviewed safety procedures and documentation in response to several occurrence reports;
- Reviewed the Plutonium-238 Project, which supplies material for the plutonium-238 batteries used by NASA to power satellites, and attended a related public meeting regarding the options for consolidating all plutonium-238 production at one location.

The division also performed periodic reviews of the National Pollutant Discharge Elimination System (NPDES) and radiological discharges at HFIR.

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3.3 Y-12 NATIONAL SECURITY COMPLEX

3.3.1 Upper East Fork Poplar Creek Watershed

Located between Pine Ridge and Chestnut Ridge, the Upper East Fork Poplar Creek Watershed includes the main Y-12 complex and its surrounding area. This watershed lies east of the Bear Creek Valley Watershed and has more than 70 known sources of contamination.

A groundwater plume contaminated with nitrates, uranium-238, and other radionuclides and metals underlies the central complex area. This plume originates from the S-3 Ponds (on the divide with Bear Creek Valley Watershed) and from other sources within the complex.

Upper East Fork Poplar Creek Phase I Interim ROD. The Phase I ROD, signed in May 2002, focuses on preventing contamination from moving away from source areas and on cleaning up concentrations of contamination. This strategy includes a variety of measures:

- Installing asphalt caps over mercury runoff areas,
- Flushing contaminated sediment from storm sewers,
- Relining or replacing storm sewers as needed in the west end mercury area,
- Building mercury treatment facilities,
- Removing contaminated sediments in Upper East Fork Poplar Creek and Lake Reality,
- Monitoring, and
- Land-use controls.

Later RODs will address additional contaminated soils and sediments, D&D of buildings, and groundwater. A Proposed Plan for Interim Actions focusing on contaminated soils and the scrapyard has been approved by the regulators and has been through public comment.

3.3.2 Bear Creek Valley Watershed

Bear Creek Valley begins at a low divide west of Y-12. The watershed historically was used for disposing of wastes generated by nuclear weapons manufacturing at the plant. The primary waste streams were machining remnants of metallic uranium, solvents, nitrates, shock-sensitive and explosive chemicals, and contaminated tools and equipment. These wastes were buried in pits, poured into holding ponds, and burned. Bear Creek Valley now hosts a state-of-the-art disposal facility—the EMWMF—for CERCLA waste created by cleanup on the ORR.

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3.4 EAST TENNESSEE TECHNOLOGY PARK WATERSHED

The ETPP Watershed occupies 4,600 acres, only about 1,000 of which have been affected by operations at the former K-25 Site. The watershed is partially bordered on the west by the Clinch River, and its tributary Poplar Creek runs through the area.

Principal contaminants in ETPP groundwater are volatile organic compounds, some radionuclides, and various metals.

Principal contaminants in the groundwater are volatile organic compounds, some radionuclides, and various types of metals. The most pervasive contaminants are trichloroethylene and technetium-99. Surface water contamination is not a major problem.

Various types of contamination can be found in both shallow soils and deeper soils. Shallow soils contain radionuclides, metals, and organics that can be traced back to spills, overflows, building runoff, and atmospheric releases. Petroleum products, volatile organic compounds, and some

radionuclides are found in the deeper soils. This contamination is the result of waste line leaks, tank leaks, and burial grounds.

Zone 1. Zone 1 consists of areas outside of the main plant site (including Duct Island, the K-770 area, the Powerhouse area, ED-3, the Contractors Spoil area, and Blair Road Quarry). Because few buildings and facilities currently exist in this section of ETPP, Zone 1 is considered to be the area easiest to remediate. Work at Zone 1 will help define the process for remediation of the main plant area. During FY 2001, the FFA parties developed a proposed plan for remediation that would allow for unrestricted industrial land use in the area. The ROD for Zone 1 was signed in November 2002. The FFA parties have finalized much of the post-ROD documentation, such as waste handling plans and remedial designs. Dynamic verification is nearly complete in the Zone 1 area. The dynamic verification strategy identified Blair Road Quarry as requiring remedial action because of polyaromatic hydrocarbon-contaminated material buried within the quarry. A remedial action to remove the contaminated soil began in November 2004 and was completed in early January 2005. More than 15,000 tons of contaminated soil from this project was transported to the EMWMF. Work to remove scrap from the K-770 Scrapyard has been ongoing. The scrap metal must be removed before the underlying soils can be characterized and remediated. Under the accelerated schedule, work is to be completed on the Zone 1 area and across the entire ETPP site by FY 2008.

Zone 2. Zone 2 is the approximately 800 acres that make up the main industrial plant area of ETPP. This area contains administration, laboratory, process, and support facilities as well as waste burial areas and scattered areas of ecological habitat. A ROD signed in April 2005 covers remediation of contaminated soils, buried waste, and subsurface structures. It is aimed at making way for ETPP's ultimate use as a commercial/industrial park with limited DOE obligations. Most Zone 2 facilities are going through D&D separately, with a limited number of buildings being title transferred to the Community Reuse Organization of East Tennessee. Post-ROD

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documentation to implement the selected remedies is being prepared for submittal to the FFA parties.

K-29, K-31, and K-33 Decontamination and Decommissioning. In August 1997, DOE signed a contract with British Nuclear Fuels LLC (BNFL) for the D&D of three large process buildings: K-29, K-31, and K-33. These buildings had been a part of the DOE gaseous diffusion process to enrich uranium at Oak Ridge. D&D work on the Three Buildings Project began in July 1998 at the K-33 building, with radioactive contaminant removal, waste storage, and metals recycling. Metals recycling was a major aspect of the D&D plan, but it was put on hold by DOE's nationwide moratorium on releasing potentially contaminated metals to the public. As a result of this moratorium, much of the metal previously planned for recycling has either gone into storage or has been disposed. The division has been overseeing this project since its beginning. As of the end of June 2005, 99 percent of the project had been completed.

The Zone 2 ROD will allow for ETTP's ultimate use as a commercial/industrial park with limited DOE obligations.

Work on Building K-29 is complete, and the building has been turned over to environmental management contractor Bechtel Jacobs Company LLC for demolition.

Decontamination of buildings K-31 and K-33 is ongoing. The cleanup and decontamination are being performed to keep the total radiological dose to an industrial worker at less than 5 mrem/year. Additionally, should the decision ever be made to demolish buildings K-31 and K-33, the debris would meet the waste acceptance criteria of three primary disposal facilities: Envirocare of Utah, the Nevada Test Site, and the on-site EMWMF. Uncontaminated debris would qualify for acceptance at the Y-12 Industrial Landfill. Because the level of contamination on floors and walls is higher than initially expected, completion of the project has been pushed back to approximately November 2005.

The Three Buildings Project is nearing completion, at which point responsibility for the facilities will be turned over to Bechtel Jacobs. Cleanup has been completed in K-31. The verification contractor is conducting a final status survey.

The D&D workshop housed on the cell floor of Building K-33 and used for the dismantlement of converters has been taken down. The supercompactor and the non-destructive assay facility have also been dismantled, with the waste going to Envirocare.

As a result of this project, more than 196 million pounds of low-level waste have been removed and sent for disposal to Envirocare, more than 34 million pounds of waste have been shipped for disposal to the Nevada Test Site, and more than 41 million pounds of low-level waste have been sent for on-site disposal at EMWMF and the Y-12 Landfill.

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The FFA requires that a removal action report be submitted by July 15, 2005. DOE, however, cannot predict when BNFL will complete the project. As a result, DOE has requested an extension to February 15, 2006.

D&D of Building K-1200. Project contractor East Tennessee Materials and Energy Corporation has finished removing all former uranium processing equipment and classified materials from the center and south bays of this building. Additionally, all transferable radioactive and classified contamination within the building has been removed. All D&D-related work has been completed. The company plans to use a portion of the building for storage of hazardous/classified materials in support of its DOE/commercial waste treatment operations. The completion date is contingent on a letter from DOE officially acknowledging that the scope of the project has been achieved.

D&D of Building K-1420. The D&D of Building K-1420 began in FY 1999 at a projected cost of \$10 million. As of May 2000, the projected cost was \$12 million and the projected completion date was early 2001. However, in December 2000 a contract dispute resulted in a suspension of all work on this project. At the time of suspension, the project was approximately 90 percent complete. As of June 30, 2005, DOE had concluded negotiations with the contractor's bonding company to complete contract performance, including the final disposition of cleanup-generated waste.

D&D of K-25/K-27. D&D activities for the K-25 and K-27 gaseous diffusion process buildings at ETTP are being accomplished under CERCLA. To facilitate completion of ETTP closure by FY 2008, this project has been assigned a high priority within the recently developed Accelerated Cleanup Plan Agreement. Buildings K-25 and K-27 were placed into operation in 1945 to enrich uranium through the gaseous diffusion process. The buildings have been permanently shut down since 1964. Because these facilities are the original gaseous diffusion facilities and are Manhattan Project Signature Facilities, there is much interest in maintaining some portions for historic significance.

As of June 30, 2005, all three phases of activity had begun in Building K-25, with abatement activities being about 88 percent complete.

D&D activities are planned in three major phases:

- Removal of hazardous materials such as asbestos,
- Removal of process equipment, and
- Demolition of the building structures.

As of June 30, 2005, all three phases of activity had begun in Building K-25, with abatement activities being about 88 percent complete. Process equipment and excess materials have also been removed from the building. Demolition of the facility structure started in October 2004. In Building K-29, abatement activities have begun and are approximately 33 percent complete. Removed material is being disposed primarily at the EMWMF. According to present schedules, this project will be completed by FY 2008.

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Group II Buildings D&D. Group II Buildings D&D includes demolition of all remaining aboveground structures at ETTP (excluding the K-25 and K-27 facilities). One generic engineering evaluation/cost analysis was done to streamline the required documentation for the facilities. Based on facility prioritization, subsequent Action Memoranda serve as the decision documentation for the specific groupings of facilities that are to be demolished.

The Main Plant demolition project covered 10 facilities and was complete in January 2004. The K-1064 demolition project covered 18 facilities and is nearing completion. The Remaining Facilities D&D covers the approximate 500 facilities remaining at ETTP, including K-1401, K-1420, the Poplar Creek facilities, and equipment from the centrifuge facilities. According to present schedules, the project will be completed by FY 2008.

Uranium Hexafluoride Cylinders. DOE stored approximately 7,000 cylinders of depleted UF₆ or its remnants at ETTP in several storage yards. The division's Radiological Monitoring and Oversight Program monitors UF₆ management. Cylinder yards are evaluated for risk to the public and environment through field measurements and inspections.

The division cooperates with DOE and Bechtel Jacobs to continue monitoring the radiation dose rate at the UF₆ cylinder storage yards. Dose rate measurements are taken at the perimeter fence lines. Monitoring of ambient gamma levels at the cylinder storage yards began in April 1999 and has continued to date. The data are being used to determine if monitored areas have exceeded state or federal regulatory limits for exposure to members of the public. These data are also being used to determine if environmental concerns are warranted and what, if any, remediation actions are necessary before this property is either free released or is occupied by private companies during the planned reindustrialization of ETTP.



A typical UF₆ cylinder is ready for transport to Portsmouth, Ohio. TDEC photo

Between January 2004 and January 2005, dose rates in excess of the 100-mrem/year state/federal exposure limit were observed at four of the five monitored cylinder yards. At these yards, the total adjusted accumulated annual dose, as measured by dosimeter, has ranged from a low of 4 mrem at the K-1066-B yard to a high of 7,186 mrem at the K-1066-K yard. Both of these values are down from last year. Specific location data have been obtained for all stations with the use of a global positioning system. This specific location data, along with their corresponding radiological data, will be

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incorporated into a computer system that allows the user to locate an individual monitoring point and view its radiological history. The ETTP cylinder yards under the dosimeter project are K-1066-K, K-1066-E, K-1066-J, K-1066-B, and K-1066-L. The K-1066-B yard has recently been removed from the program because the cylinders were removed as part of the shipment of all UF₆ cylinders to Portsmouth, Ohio. The empty yard continued to be monitored for two quarters after the cylinders were removed, and no radiation above background was found to exist.

Plans by ETTP to prepare cylinders for yard-to-yard movement and off-site shipment will necessitate “shuffling” cylinders between various yards. Due to this activity, there have been some wide variances in the dosimeter readings from quarter to quarter. These have all been checked and correlated with redistribution of the cylinders. The current positions of optically stimulated luminescent dosimeters are monitored to ensure perimeter coverage of the yards as the cylinder configuration continues to change.

Division staff review quarterly reports, occurrence reports, and information from the cylinder information database and make site visits to observe cylinder yard activities. DOE achieved the FY 2005 goal of 2,448 annual inspections and 37 quadrennial inspections. The majority of inspections were covered by the required inspections for moving and shipping.

DOE began shipment in March 2004 of full depleted UF₆ cylinders to Portsmouth, where the material is converted to a more stable form. Division staff had previously reviewed transportation plans for shipping American National Standards Institute N14.1-compliant cylinders, with the shipments to be completed in 2005. As of June 2005, DOE had shipped more than 3,850 cylinders. Staff reviewed revisions to transportation plans for shipping non-compliant cylinders, with those shipments to be completed in 2006. Staff participated in conference calls with agencies in the affected states and reviewed the progress of cylinder removal at ETTP.

TSCA Incinerator. The Toxic Substances Control Act of 1976 (TSCA) Incinerator, located at ETTP, is designed to treat mixed waste and PCBs (“mixed” waste contains both radioactive and hazardous contamination). This is the only incinerator in the United States permitted to treat mixed waste contaminated with PCBs.

With the shutdown of DOE incinerators in Idaho and South Carolina, Oak Ridge’s TSCA Incinerator has become a “one-of-a-kind” treatment option. In support of accelerated cleanup plans across the entire DOE complex, the current strategy is for the incinerator to remain operational until 2008.

The division’s Waste Management Program monitored incinerator operations in FY 2005. During the year, the state approved two modifications to the incinerator’s FY 2004 Burn Plan; afterward, it gave conditional approval for the FY 2005 Burn Plan. The division performs a detailed review of waste characterization data before out-of-state waste is shipped to the incinerator. The review also focuses on whether

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incineration was the only treatment option for those out-of-state waste streams. The incinerator once again operated during FY 2005 in compliance with its permits.

The incinerator operators performed comprehensive performance tests in March 2005 to demonstrate compliance with Maximum Achievable Control Technology parameters, which went into effect on September 30, 2003. The tests were performed according to the construction permit, which allowed for changes in bounding conditions for certain parameters. A detailed risk assessment will be performed as part of the RCRA permit renewal currently under way. The purpose of the RCRA risk assessment is to evaluate potential human health and ecological risks posed by non-radiological emissions from the incinerator. The state is currently reviewing the compliance performance test data and plans to request public comment on the outcome. Once the comprehensive performance test results are evaluated, the more restrictive of RCRA or maximum achievable control technology provisions for individual parameters will be incorporated into the risk analysis, which needs to be approved before RCRA and air permits are issued. In FY 2005, the incinerator treated nearly 600,000 pounds of waste.

3.5 WASTE MANAGEMENT

3.5.1 Oak Ridge Environmental Management Waste Management Facility

Also known as the CERCLA waste disposal facility, the EMWMF was built to dispose of the large volumes of contaminated waste generated by remedial actions on the ORR, a formidable and expensive disposal problem. Historically, there have been two options for this waste: Package and ship it to out-of-state locations or delay cleanup and leave the waste in the environment.

The option of leaving contamination in place is not acceptable for most sites, especially those with future uses or those that may be sources of groundwater contamination. On the other hand, shipping the vast quantities of contaminated soil and debris to disposal sites in the western United States is prohibitively expensive. The ORR has long needed an on-site waste disposal facility that is properly engineered and constructed.

DOE, EPA, members of the public, and the state—through the division's Environmental Restoration Program—took part in the planning and decision-making that authorized the facility. The EMWMF is now up and operating and has received waste from several projects on the ORR.



TDEC photo
A division environmental specialist changes a filter in a high-volume air monitor at the Environmental Management Waste Management Facility.

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Because of the nature of the contaminants being disposed, the EMWMF will have to be maintained essentially forever. In order to help in this endeavor and to ensure surveillance and general maintenance, Tennessee has established a trust fund to which DOE makes annual allotments; these allotments will continue until the principal in the fund reaches \$14 million. The state plans to use revenue generated from the fund to provide surveillance and maintenance after final closure of the EMWMF. It should be recognized, however, that this fund will not cover all expenses necessary in the long term to ensure this facility does not endanger human health and the environment. The federal government will remain responsible for assuring this protectiveness as long as EMWMF contents remain a potential hazard.

The division has been active in environmental oversight of the EMWMF. Staff participated in the core team during the design and construction of several projects. Due to higher-than-expected groundwater levels under Cells 2 and 3, a groundwater suppression system was designed and constructed at the EMWMF. Also, design and construction of Cells 3 and 4 were completed. The division will continue to provide environmental oversight of this facility, which is a high priority for the state.

3.5.2 Solid Waste

The division, through its Waste Management Program, works to ensure that DOE adheres to provisions of RCRA (See Environmental Laws sidebar) and to the rules and regulations governing solid waste disposal in Tennessee.

Oak Ridge Reservation Landfills. The ORR landfills at Y-12 are used to dispose of solid wastes, which must be non-hazardous, non-radioactive, and non-RCRA-regulated. DOE must use approved operations in receiving, compacting, and covering waste.

The division performs a monthly audit of DOE's landfills on the ORR. It also reviews DOE practices to ensure that radioactive waste is not disposed in these landfills. Table 1 presents the FY 2005 summary report of waste deposition in the four ORR landfills now in use.

Table 1. Waste Summary Report FY 2005

Landfill No.	Volume (cubic yards)
IV	192
V	49,736
VI	Closed
VII	69,338

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Industrial Landfill IV. This industrial waste landfill operates as an approved Class II landfill in accordance with TDEC permit No. IDL-01-103-0075. Because it was opened before implementation of TDEC's current Class II requirement, the eastern area does not require a leachate collection system or gas monitoring capabilities. However, it does have a leachate collection system in place in the western area and a gas monitoring system. Landfill IV is a classified industrial landfill.

Industrial Landfill V. Industrial Landfill V is a Class II landfill permitted under TDEC permit No. IDL 01-103-0083. The landfill receives mostly sanitary and industrial waste generated at the plants, as well as special waste approved by TDEC. This landfill has a leachate collection system.

Construction/Demolition Landfill VII. Landfill VII is a Class IV landfill permitted under TDEC permit No. DML-01-103-0045. It is used for the disposal of demolition/construction waste, as well as similar waste approved by TDEC.

LANDFILL CLASSES

Class II: A landfill that receives waste generated by one or more industrial or manufacturing plants and that is used or is to be used for the disposal of solid waste generated by such plants. The waste may include industrial wastes, commercial wastes, institutional wastes, farming wastes, bulky wastes, landscaping and land-clearing wastes, and construction/demolition wastes.

Class IV: A landfill that is used or is to be used for the disposal of demolition/construction wastes and certain special wastes having similar characteristics.

3.5.3 Hazardous Waste Management

In FY 2005, the division participated in hazardous waste compliance evaluation inspections at ORNL, Y-12, and ETPP under the August 13, 2003, Low-Level Waste Management Agreement between the state and DOE. As a result of these inspections, notices of violation were issued to ORNL and ETPP.

The problems at ORNL were discovered during a May 2–5, 2005, inspection of a legacy low-level waste sorting project. They included violation of storage limitations on regulated items and two drums of improperly characterized RCRA waste.

The ETPP violations were uncovered during a February 22–25, 2005, inspection. Several containers of mixed waste were found that had been stored for more than a year and were not part of the site treatment plan, in violation of state regulations. In addition, one container that had also been stored for more than a year violated a 2003 low-level waste management agreement, one container of sludge was in an unacceptable condition, and labels were missing from tank piping.

3.5.4 Radioactive Waste Management

Low-Level Radioactive Waste. Under the Oak Ridge Accelerated Cleanup Plan Agreement, DOE will dispose all legacy low-level waste by the end of FY 2005.

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(Legacy waste refers to waste that was in DOE Environmental Management program inventories prior to September 30, 2000.) As part of this effort, DOE has begun characterizing (including sorting and segregating) the legacy waste that has accumulated on the ORR. This effort has resulted in the disposal of more than 26,000 of the more than 32,000 cubic meters on hand at the end of September 2002.

As of June 30, 2005, the inventory of legacy low-level waste on the ORR was about 5,700 cubic meters. This does not include about 2,400 cubic meters of newly generated low-level waste in storage and approximately 3,300 cubic meters of grandfathered waste. Since the beginning of FY 2005, DOE has reduced its legacy low-level waste inventory by about 80 percent.

“Grandfathered waste” is a special category of legacy low-level waste at Y-12. Grandfathered waste was certified to earlier waste handling requirements and must be further characterized and sorted to meet waste acceptance criteria at disposal facilities. The Environmental Management program set a deadline for acceptance of grandfathered waste and accepted no additional grandfathered waste after FY 2004. Some of the 3,282 cubic meters of grandfathered waste remaining at Y-12 has been incorporated in a security barrier around the exclusion area of the plant. The waste in this barrier will not be dispositioned until a new protected area currently under construction is up and running. The target date for the protected area to be fully operational is 2010. The remainder of the National Nuclear Security Administration (NNSA) grandfathered waste will be dispositioned as funds become available. Because of the high cost of characterization and sorting/segregating operations, current funding will not be enough to significantly reduce the storage of grandfathered waste. DOE must find an administrative pathway for the characterization and disposition of Y-12’s legacy low-level waste.

Spent Nuclear Fuel. The division, represented by the Radiological Monitoring and Oversight Program, follows all spent nuclear fuel (SNF) issues, including inventory, storage, retrieval from below-grade storage, repackaging for shipping, shipping-cask inspection, and all other transportation issues related to shipping. All of the SNF on the ORR is housed at ORNL. DOE is nearly finished shipping legacy SNF to locations outside of Tennessee and continues to generate and manage SNF from HFIR operations.

DOE is nearly finished shipping legacy spent nuclear fuel to locations outside of Tennessee.

All shipments of both aluminum-clad and non-aluminum-clad SNF were completed in FY 2004. All SNF has been removed from SWSA 5.

Removal of the MSRE fuel salts is under way. Removal of the uranium-233 as UF₆ was begun in FY 2005. The uranium-233 will be collected on sodium fluoride traps, placed in interim storage at ORNL Building 3019, and dispositioned with the rest of the

3.0 Environmental Management

uranium-233 material. The MSRE fuel salts will be stored at the ORNL TRU storage facility at SWSA 5 until a final disposal location is chosen.

HFIR SNF shipments are ongoing, since that facility is still in operation. Only two shipments of HFIR SNF were made in FY 2005. The remainder of the SNF is being stored in the facility's pool. Shipments will resume in FY 2006.

3.5.5 Mixed Waste Site Treatment Plan

The Site Treatment Plan is a mixed-waste management tool authorized through the Federal Facility Compliance Act (see "Environmental Laws" sidebar). Mixed wastes have both hazardous and radiological constituents. The Site Treatment Plan is implemented through a TDEC Commissioner's Order because the hazardous constituents are regulated. This enforceability has usually resulted in an effective work-off of inventories according to negotiated schedules.

TRU radioactive wastes have only one disposal option: the Waste Isolation Pilot Plant in New Mexico. DOE's inability to obtain a RCRA permit modification from the state of New Mexico has resulted in delays in the proposed treatment schedule for ORR's TRU waste. DOE is continuing to challenge the appropriateness of the TRU milestones in the Site Treatment Plan. In FY 2003, the dispute resolution was escalated to a "Formal" status, allowing the dialogue to take place at the TDEC Commissioner's level.

In January 2004, DOE complied with the Site Treatment Plan enforceable framework by starting to process supernate—the liquids left on top of tank residues—from Melton Valley low-level liquid waste tanks. The Melton Valley Transuranic Waste Remediation Facility at ORNL has provided a much-needed mixed waste treatment capacity. By October 30, 2004, the facility processed and shipped 1,535 cubic meters of low-level (radioactive) waste to the Nevada Test Site, ahead of the supernate treatment milestone agreed to by DOE and the state.

In September 2004, DOE requested an extension of a milestone for certain wastes listed in Table 3.4 in the Site Treatment Plan, citing national treatment capacity issues for its inability to ship waste for treatment and disposal. The state rejected the request for extension, noting that lack of adequate characterization is the principal issue. Currently, DOE is continuing to ship these wastes for treatment and disposal. The effort includes characterization as well as designation of some wastes for treatment at the TSCA incinerator. As of June 30, 2005, nearly 600,000 pounds of these wastes remains to be shipped to treatment and/or disposal.

3.5.6 Facility Surveys

Five decades of nuclear weapons research and development on the ORR has left a legacy of contamination in the local and regional environment, including land and water ecosystems. Most of this radiological and chemical contamination was released directly from buildings and other facilities.

3.0 Environmental Management

In an effort to document the nature and sources of contamination, the division's Radiological Monitoring and Oversight Program conducts a Facility Survey Program (FSP). The FSP documents the following for facilities:

- Operational history,
- Physical condition,
- Past release history,
- Radioactive and chemical inventories, and
- Potential for ongoing and future releases.

As facilities are examined, they are ranked according to their potential to harm the environment. Since 1994, the FSP has examined 172 facilities, 61 of which held a high potential for environmental impact. The FSP characterized two facilities at Y-12 in FY 2004 and found that one of these had a high potential for release of contaminants to the environment. In many cases, the potential for environmental release is dominated by degraded or poorly maintained facilities and infrastructure, such as underground waste lines, substandard sumps and tanks, leaky roofs, and peeling lead-based paints. When facility problems are noted by the FSP, they are relayed to DOE, where corrective actions can be formulated. As corrective actions are completed, facilities are removed from the division's list of High Potential Environmental Release facilities. To date, 12 facilities have been removed.

Beginning in 2002, facility survey staff began refocusing their primary effort on the oversight of facilities slated for D&D and demolition at ORNL and Y-12. This activity was in response to formal, accelerated infrastructure reduction (demolition) programs at each of those sites. Staff completed organized document reviews and field oversight of all activities related to facility demolition. During 2004, staff made 463 field visits before and during the demolition of 38 facilities.

3.5.7 Verification of Surplus Materials Release

Division staff review radiological control procedures and ensure that DOE and its contractors follow agreed policies for release of materials to the public. Under this activity, staff from the Radiological Monitoring and Oversight Program review occurrence reports when radioactively contaminated materials are inadvertently released. In addition, staff members check public auctions for adherence to release policies and conduct spot radiological surveys. Surveys of public auction items were conducted for 15 public auctions by Y-12 Surplus Sales and ORNL Surplus Sales. ETTP did not schedule any public auctions during this year. Scrap metal is also monitored under this program. Clean scrap metal is sold under annual sales contracts at ORNL and Y-12. Previously, staff reviewed the scrap metal sales program at each facility. Procedures for surveying and controlling the flow of clean scrap metals were reviewed.

4.0 Regional Environment

While pollutants released from the ORR have substantially decreased over the years, concerns remain that emissions from current activities could pose a threat to public health and the environment. To help ensure that emissions from the ORR are identified and properly controlled, the TOA specifies the state shall do the following:

- Perform independent oversight and evaluation of DOE's environmental monitoring programs;
- Monitor radiation on the ORR and environs, as necessary, to detect and characterize off-site contamination and human exposure; and
- Evaluate performance of on-site control measures to prevent releases to the environment.

In response to these requirements, the division has developed programs that provide independent monitoring of all media on and in the vicinity of the ORR and oversight of DOE monitoring and control systems. Designed with the cooperation of DOE and EPA, these programs were developed to complement and verify monitoring performed by DOE's contractors.

The division provides independent monitoring of all media on and in the vicinity of the ORR and oversight of DOE monitoring and control systems.

4.1 WATER QUALITY

Activities on the ORR have contaminated more than 100 miles of surface streams and considerable (but unknown) quantities of groundwater in East Tennessee. While effluents from process waste streams contribute to this contamination, much of the pollution found in waters on the ORR can be attributed to releases from antiquated and deteriorating waste disposal, transport, and storage facilities. To a large degree, these contaminants migrate to groundwater, where they are discharged to local streams and carried to the Clinch River. While ORR contaminants are diluted by the Clinch River, evidence of their presence can be found downstream to Watts Bar Dam and beyond.

Each of the division's program areas has been delegated specific responsibilities designed to protect the state's water resources. These responsibilities include the oversight of DOE monitoring systems as well as independent monitoring as necessary to verify DOE controls and ensure that the public and environment are adequately protected.

4.0 Oak Ridge Regional Environment

4.1.1 Drinking Water Supplies

The division continued in FY 2005 to oversee maintenance and compliance activities for the water treatment and distribution systems serving DOE's Oak Ridge facilities. This work includes the following:

- Independent monitoring of residual chlorine levels; and
- Oversight of cross-connection controls, water line repairs, and the general status of distribution systems.

The division did not detect any serious threats to worker or public safety. However, given the challenges present on the ORR—including burial grounds, contaminated soils, and contaminated groundwater—evaluation of the potable water distribution systems at the three plant sites remains an ongoing need. Noteworthy events include the following:

ORNL. On September 20, 2004, division staff accompanied Division of Water Supply personnel on the sanitary survey of the ORNL water distribution system. Initial results of the review indicate that for the most part, the system meets or exceeds all required operating parameters. No deficiencies were noted during the survey.

Y-12. On September 23, 2004, division personnel accompanied Division of Water Supply personnel on the sanitary survey of the Y-12 water distribution system. Initial results of the review indicate that for the most part, the physical system meets or exceeds all required operating parameters. However, three deficiencies were noted during the inspection, and a Notice of Violation was issued to Y-12. The first deficiency was that the list of backflow-prevention devices was out of date. The list was updated to reflect the current status of all devices located at Y-12. The second deficiency was that, because of the first item, Y-12 was not meeting requirements of the Cross Connection Control Policy and Program. Correction of the first deficiency also corrected the second. The third deficiency related to the Y-12 management structure; specifically, the roles and responsibilities for controlling cross connections are not clear. This issue is being addressed. A follow-up survey will be conducted by the TDEC Division of Water Supply to evaluate the corrective actions taken by Y-12.

ETTP. Continuing D&D activities have reduced the size of the distribution system at ETTP. Lines are being taken out of service and cut and capped as demolition proceeds. On August 31, 2004, TDEC did a sanitary survey of the ETTP water treatment plant and distribution system. Initial results of the review indicate that for the most part, the system meets or exceeds all required operating parameters. The only area noted as possibly needing improvement was in the area of record-keeping methodology, specifically the method used to record turbidity at the water treatment plant. This was of interest because new regulations led to a change in reporting requirements in 2005. Another area of discussion centered on the monitoring of chlorination by-products. This sampling is conducted at the far reaches of the distribution system, and the locations of the sampling were discussed. It should be noted that this was not deemed a deficiency by the Division of Water Supply. A review of backflow-prevention-device records was also discussed as required. No current deficiencies were noted in these records.

4.0 Oak Ridge Regional Environment

Environmental Radiation Ambient Monitoring System Drinking Water

Program. The Clinch River serves as a raw water source for public water supplies in the vicinity and downstream of the ORR. Consequently, there is a potential for these utilities to be impacted by radiological releases from the reservation. To address this possibility, division personnel arranged for area treatment facilities to be included in the EPA Environmental Radiation Ambient Monitoring System (ERAMS) Drinking Water Program. The program monitors drinking water from public supplies near nuclear facilities across the nation. In the Oak Ridge program, EPA provides radiochemical analysis of samples collected by division staff at five drinking water supplies:

- Kingston Water Treatment Plant,
- Gallaher (K-25) Water Treatment Plant,
- West Knox Utility,
- City of Oak Ridge (Y-12) Water Treatment Facility, and
- Anderson County Utility District.

Four of these facilities are located on the Clinch River in the immediate vicinity of the ORR. The fifth, Kingston Water Treatment Plant, is located on the Tennessee River just above its confluence with the Clinch River.

A large proportion of the radioactive contaminants transported off the ORR in surface water enter the Clinch River by way of White Oak Creek, which drains the ORNL complex and associated waste disposal areas. Since the Gallaher Water Treatment Plant is the closest water supply downstream of White Oak Creek (approximately 6.5 river miles), this facility would be expected to exhibit the highest concentrations of radioactive contaminants of the five utilities monitored. Conversely, the Anderson County Facility (located upstream of the reservation) would be expected to be the least vulnerable to ORR pollutants. Based on data collected in this program, the above appears to be the case. However, results for the Gallaher facility, as well as the other facilities in the program, have all remained well below applicable drinking water standards.

Radiological data for public water for systems in the vicinity of the ORR continue to be well within applicable drinking water standards.

4.1.2 Groundwater

Eighty-five percent of the ORR is undeveloped; most of the groundwater under these areas has not been contaminated and should be protected. Groundwater in and adjacent to industrially developed areas is generally in very poor condition or in danger of being degraded through expansion of contaminant plumes. In most cases where contaminated groundwater has migrated off-site, restrictions on groundwater use are communicated to non-DOE land users. The Clinch River ultimately dilutes many of the groundwater discharges from springs near watercourses on DOE and Tennessee Valley Authority (TVA) property.

4.0 Oak Ridge Regional Environment

The division's groundwater programs range from a review of DOE efforts to independent sampling. The division oversees the plugging and abandonment of monitoring wells on the ORR, samples off-site residential drinking water wells, and helps collect and evaluate data for DOE's Oak Ridge Environmental Information System. The division also reviews documents released by DOE under CERCLA, NEPA, and other programs that may influence groundwater-cleanup or groundwater-use decisions on the ORR.

Y-12. Groundwater is contaminated beneath the Y-12 plant site, with plumes extending both east and west. Groundwater in the vicinity of Y-12 contains metals (including mercury), solvents, and uranium. A carbon tetrachloride plume extends east of Y-12 off the reservation beneath Union Valley. The groundwater plume west of Y-12 emanates from the former S-3 ponds and is joined by contaminants from disposal areas in Bear Creek. The S-3 ponds, which were closed with contaminants in place, produce a nitrate plume with significant amounts of uranium. Y-12's waste area in adjacent Bear Creek Valley contains uranium, PCBs, and solvents, some of which are present in secondary sources where these denser liquids sank deep in the cavernous bedrock below the water table.

With the end of the drought, springs and seeps returned to flow and water levels at the EMWMF rose to within 2 feet of the liner system.

Disposal sites on Chestnut Ridge are grouped with the Y-12 hydrogeologic regime. The groundwater plume beneath Chestnut Ridge can be detected in springs east of the reservation at the University of Tennessee Arboretum.

A drought ended in 2004, and under wetter conditions many springs and seeps returned to flow after several years of no flow. At the EMWMF in Bear Creek Valley, water levels rose to within 2 feet of the liner system. DOE provided an engineering solution to this groundwater elevation problem (Section 3.5.1). The division will continue to measure groundwater elevations to verify that they are effectively lowered.

ORNL. ORNL has significant groundwater contamination both under the main plant site and in Melton Valley. At ORNL, radionuclides contaminate groundwater in the main building area, with strontium-90 being the major concern. Groundwater beneath the ORNL maintenance facility contains solvents. Waste from ORNL operations disposed in adjacent Melton Valley includes tritium and many other radionuclides, as well as chemicals from experiments. The South Campus Facility on the east end of Bethel Valley has a plume of solvents that have been detected in springs close to what is now city of Oak Ridge property.

ETTP. ETTP has contamination under the main plant and at adjacent smaller sites. The groundwater plume is also discharging off the ORR, mainly through springs onto TVA property. Groundwater at ETTP has considerable quantities of solvents and measurable amounts of uranium and other radionuclides, such as technetium-99.

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Residential Groundwater Sources. The division has altered the protocol for residential well sampling, with wells now sampled only by request. Test results from previous events indicate that the water in these sources is not currently affected by DOE operations. Most homeowners interviewed are satisfied with groundwater quality, and the quality of water from these sources appears to be good.

Springs and Seeps. Sampling of springs and seeps has been ongoing since 1992. Samples are taken at different times of the year from springs and seeps both on and off the ORR. Springs and seeps provide exit pathway monitoring points, some close to burial grounds and others some distance away. This program continues to look for new springs and seeps to sample. The division sampled 17 springs in the fall of 2004 and 38 more in the spring of 2005, either monthly or quarterly.

Sampling of springs provides insight into how contaminants travel in groundwater. Springs in Bear Creek Valley, downgradient from the Bear Creek burial grounds, continue to be contaminated by radiochemical, metal, and volatile organic constituents. Several springs at ETTP, Y-12, and ORNL are impacted as well. Volatile organics, nitrates, and gross alpha and gross beta activity are the contaminants of greatest concern.

Off-site springs at the UT Arboretum and in Union Valley continue to exhibit volatile organic contaminants.

Two off-site springs east of Y-12 are of special interest because they represent pathways onto public areas. The University of Tennessee Arboretum spring “Bootlegger” continues to exhibit volatile organic contaminants. A Union Valley spring—Cattail Spring—also continues to have a volatile organic signature. These springs have groundwater pathways from contaminated areas associated with Y-12.

Some springs at ETTP show elevated volatile organic compounds and radionuclides. ORNL springs that were sampled during this sampling period showed no elevated results of volatiles.

The levels of contaminants are low, with some exceptions near waste sites, and the general quality of groundwater on the ORR is good. The fact that contaminants can still be measured at distances from some sources, however, emphasizes the need to protect the remaining clean groundwater on the ORR from spreading contaminant plumes.

Aquatic Plant Sampling. For 2005, this project focused on evaluating data from the past 3 years and determining which areas were most likely to be impacted by the uptake of contaminants through aquatic plants. This project may directly correlate with water quality in the area. Watercress was sampled because it is abundant and allows all aspects of sampling to be as similar as possible. To date, 12 of the original 16 locations have been sampled, and five additional areas have been added due to concerns. Due to changes in the lab, no data has been received to date for FY 2005. The division hopes to show that these areas indeed have an affect on the food chain and may be impacted by

4.0 Oak Ridge Regional Environment

contaminants in the surrounding environment. Levels will be compared to U.S. Food and Drug Administration contaminant guidelines.

Plugging and Abandonment of Wells. There are more than 4,000 monitoring wells and borings on the ORR. In this project, the division requests and reviews data on ORR wells that will be—or have been—plugged and abandoned. With the exception of RCRA and Underground Storage Tank regulations, the state has no specific regulations concerning the plugging and abandonment of monitoring wells unless it can be demonstrated that the wells are contributing to pollution. The division has not received any reports of plugging and abandonment activity during the last year.

Underground Storage Tanks. The division oversees the underground storage tank program on the ORR. In FY 2005, the division tracked sites that have been integrated into the CERCLA cleanup program, specifically the East End Fuel Station at Y-12.

Groundwater Strategy. DOE has drafted a strategy to address remediation of groundwater plumes. The following general topic areas for a strategy are being addressed: problem formulation, uncertainty management, technology choices and performance objectives, and stewardship.

The division would like to see the conceptual model of ORR groundwater updated to include the complexities of the geology. Aquifers in soluble carbonate rock are widespread on the ORR. These areas have springs, sinkholes, caves, and crevices that collectively are termed “karst.” Karst aquifers transmit contaminants rapidly and unpredictably, making it difficult to investigate and clean up groundwater. The flow of groundwater within the less permeable shale rock needs to be re-evaluated as well.

4.1.3 Surface Water

Surface Water Sampling. The division’s Environmental Monitoring and Compliance Program sampled surface water at 25 sites in FY 2005. Twenty-one of these were chosen to detect contamination from DOE. The other four are located upstream from the ORR and serve to provide background data.

The sites were sampled twice in FY 2005, and results will be published in the April 2005 Annual Monitoring Report, available to the public from the division. Samples were analyzed, and the results were compared with Tennessee Water Quality Criteria, a state water quality standard published by TDEC and based on the Clean Water Act. The division has not observed substantial concentrations of pollutants coming from the reservation.

Although the state has found that White Oak Creek is not supporting its designated uses under the Water Quality Criteria, the creek does not alter the designated use of the Clinch River. This is because the Clinch is a much larger stream and, therefore, dilutes contaminants from White Oak Creek.

4.0 Oak Ridge Regional Environment

Bear Creek Uranium Study. Over the years, millions of pounds of uranium have been disposed in ponds and shallow unlined trenches in Bear Creek Valley at Y-12. Often placed within or below the water table, the uranium and associated contaminants migrate into groundwater, then through the valley along complex pathways that change seasonally and in response to rain. Dominated by the well-developed karst drainage of the Maynardville Limestone, these flow paths have proven difficult to characterize, despite numerous studies in the past.

To gain a better understanding of the sources, transport, and fate of the uranium and other contaminants in the waters of the valley, the division began collecting samples along Bear Creek, its tributaries, and associated springs in 2001. Data from the project indicates most of the uranium in Bear Creek is delivered along discrete, low-volume, high-concentration flow paths during the wetter parts of the year. Once in the creek, uranium follows the mixed surface and subsurface drainage of the Maynardville Limestone through the valley. In this respect, the water in Bear Creek is both lost to and recharged by the aquifer beneath. For example, Bear Creek as a whole can be observed during base flow descending through an opening in the bedrock (a swallet) into the aquifer, only to resurface in springs further downstream. While most of the uranium carried into the subsurface re-emerges in the gaining sections of the creek, a portion appears to be lost to the deeper aquifer, as evidenced by data obtained from deep wells in the valley. The largest source in the valley is the Bear Creek Burial Grounds, where more than 40 million pounds of depleted uranium was disposed in shallow, unlined trenches during operations.

The largest source in the valley is the Bear Creek Burial Grounds, where more than 40 million pounds of depleted uranium was disposed in shallow, unlined trenches.

Many of these trenches extend below the water table, as evidenced by historical photos showing wastes inundated by groundwater. Current releases are believed to be transported by shallow groundwater and stormwater runoff to local streams that then carry the contaminants to Bear Creek and down the valley. If not mitigated or remediated, these releases, along with uranium daughter products, can be expected to continue to spread contamination until the uranium source is exhausted (a very long time).

While the burial grounds contain the largest quantity of uranium disposed in the valley, groundwater flowing through the area known as Boneyard/Burnyard has been responsible for the largest releases to date. Contaminants migrating from Boneyard/Burnyard in the groundwater are discharged to North Tributary 3, which carries them to Bear Creek. To reduce the amount of uranium entering Bear Creek from the Boneyard/Burnyard, remedial activities during 2001 and 2002 rerouted groundwater flowing through the area and excavated a large portion of the uranium wastes and contaminated soils associated with the site. According to estimates made by DOE's contractors, the actions should have reduced the amount of uranium in Bear Creek by 70 percent. Data collected in the program after the effort indicate the amount of uranium carried by North Tributary 3 decreased, but the amount of uranium in Bear Creek itself increased. Based on observations made at the site by staff, it is believed the increase

4.0 Oak Ridge Regional Environment

may have been due to contaminants carried to the creek by surface runoff from areas excavated during the remediation. Sampling performed during FY 2005 shows no changes in contaminant loading.

4.1.4 Water Pollution Control

National Pollutant Discharge Elimination System Compliance. Division Waste Management staff monitored the various phases of the ORR wastewater treatment facilities' operations, their radiological effluents, their potential impacts to water quality both on and off the ORR, and their possible impacts to human health and the environment. The staff reviewed monthly discharge monitoring reports for reported noncompliance with NPDES permits at ETTP, ORNL, and Y-12. The TDEC Division of Water Pollution Control holds the official copies of these permits. Radiological NPDES data, reported in discharge monitoring reports, was periodically reviewed and evaluated to determine the effectiveness of DOE's water pollution control program in protecting waters of the state from radioactive contaminants.

NPDES activities also included the following:

- Division staff coordinated with the Division of Water Pollution Control concerning the renewal of NPDES permits for ORNL and Y-12. Potential Radiological Monitoring Plan requirements were discussed.
- Division staff accompanied Division of Water Pollution Control personnel during an inspection of ETTP. No significant problems were noted from this inspection.
- The staff continued to monitor levels of mercury in East Fork Poplar Creek at Station 17, which is at the Y-12 boundary (see Figure 1). A 1999 TDEC consent order mandates management of mercury concentrations in East Fork Poplar Creek. DOE has been unable to achieve an interim guideline of 5 grams per day (averaged over 3 months).

Aquatic Resource Alteration Permits and Wetlands Protection. The division assisted DOE and the state Water Pollution Control Division, Knoxville Environmental Field Office, in review of Aquatic Resource Alteration Permits for construction and maintenance projects on the ORR. The division's involvement and recommendations, including site visits and CERCLA documentation review, facilitated and streamlined permitting decisions. The Water Pollution Control Division holds the official copies of the permits.

Division staff inspected erosion and sediment control practices at various sites of the ORR, including those related to upgrades at the ORNL campus, the Highly Enriched Uranium complex construction site at Y-12, and improvements to ORR fire roads.

As in previous years, division staff continued to inspect erosion control practices in FY 2005 at ETTP's Horizon Center. Again, inadequate measures were noted and

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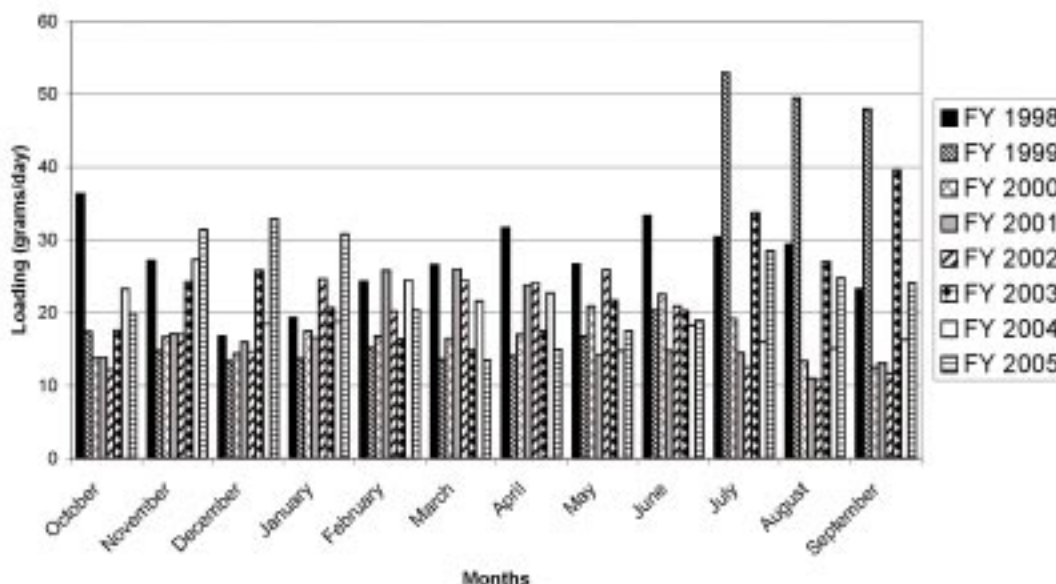


Figure 1. Mercury loadings for EFPC at the Y-12 boundary, October 1997–September 2005.

communicated to DOE and the state Water Pollution Control Division, Knoxville Environmental Field Office.

Biosolids Application Program. This program results from an agreement between DOE and the city of Oak Ridge to allow the city to spread limited quantities of class B sludge from the municipal sewage treatment plant on ORR property. In FY 2005, division staff attended meetings of the ORR Biosolids Working Group, composed of city, DOE, and DOE contractor representatives. The disposal of non-class B sludge from the city Oak Ridge as special waste at the Y-12 landfills will continue until renovations of the solids-processing equipment at the treatment plant have been completed.

Toxicity Biomonitoring. DOE, in accordance with its NPDES permits, performs toxicity testing of final effluents from waste treatment facilities. Testing for survival and growth of test organisms is conducted to determine what impacts, if any, DOE discharges may have on aquatic life in the various receiving streams on the ORR. The division continued evaluation of DOE's self-monitoring program results, which are published annually in the DOE ORR Annual Site Environmental Report and reported in discharge monitoring reports.

DOE reports confirmed that, generally, DOE waste treatment effluents did not exhibit toxicity in excess of the permit limits.

During January 6–12, 2005, Y-12 conducted a toxicity test at East Fork Poplar Creek in-stream monitoring point 201, which showed an unexpected reduction of reproduction by the test invertebrate. Heavy rain during the test resulted in a slightly turbid water sample. The confirmation testing of clear water conducted on January 21–28, 2005, showed no toxicity.

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4.2 AIR QUALITY

Historically, air emissions from DOE activities on the ORR have been blamed for causing illness among area residents. While airborne emissions have decreased with the termination of many earlier operations on the ORR, current processes (e.g., incineration of radioactive wastes, production of radioisotopes, nuclear reactor operations, and remedial activities) continue to pose a threat to the local air quality. As a consequence, the division has developed air monitoring programs to assess the impact of ORR air emissions on the surrounding environment and the effectiveness of DOE controls and monitoring systems.

4.2.1 Ambient Air Monitoring for Radionuclides

The division collects samples from 20 air samplers placed on and near the ORR.

To address the monitoring of radiological air emissions required by the TOA, the division has developed three integrated, but distinct, air monitoring programs. Together, the projects collect samples from 20 air samplers placed at selected locations on and near the reservation. The perimeter and fugitive air programs focus on radiological monitoring at exit pathways, non-point sources of air emissions, and sites of special interest. The division's participation in EPA's ERAMS supplements the other two programs, targets specific operations (e.g., HFIR, TSCA Incinerator), and provides independent verification of both state and DOE monitoring data.

In addition to the above, the division has been conducting a pilot study to assess the feasibility of monitoring radon emissions over ORR burial grounds. The study was prompted by a concern that the disposal of millions of pounds of uranium in these burial grounds could result in elevated levels of radon (radon is produced by the natural decay of radionuclides in the uranium decay series).

Perimeter Air Monitoring Program. The Perimeter Air Monitoring Program uses 12 low-volume air samplers to monitor contaminants at the most likely exit points from the ORR and at a background station (Fort Loudoun Dam). To a large degree, data collected from the perimeter monitors have been consistent with background measurements. Slightly elevated results (above background measurements) have been observed at stations near Y-12, but the levels measured are well below standards provided in the Clean Air Act. It is believed that the current campaign at Y-12 to modernize operational facilities and tear down unneeded buildings may have caused the slightly elevated results.

Fugitive Air Monitoring Program. The Fugitive Air Monitoring Program uses high-volume air samplers mounted on trailers to monitor fugitive/diffuse sources of radioactive air emissions. Since the units are mobile, the samplers can be placed where there may be contaminant releases due to localized conditions (e.g., building demolition, remedial actions). Results are evaluated by comparing the data from the mobile units to background results and standards provided in the Clean Air Act. In 2004 and 2005, the

4.0 Oak Ridge Regional Environment

mobile samplers were used to monitor cleanup of the K-31 and K-33 process buildings at ETTP, initial remedial activities at the K-25 process building at ETTP, and the disposal of CERCLA waste in the EMWMF.

From August 1999 through December 2004, a fugitive monitor was stationed between the K-31 and K-33 buildings at ETTP. These facilities, along with associated equipment, were contaminated during process operations and were cleaned up as a CERCLA action during the monitoring period. The primary contaminants were uranium isotopes, but technetium-99 and TRU radionuclides were also present due to the periodic reprocessing of SNF.

While individual results are expected to fluctuate somewhat, a general trend can be observed in data collected at the K-31/K-33 facilities that consistently rises from background levels to greater than five times the background results. To illustrate this trend, Figure 2 depicts gross alpha data reported for samples collected at the facilities minus the background measurements. Negative values in the chart represent instances where the background measurements exceeded the field measurements, which is not uncommon on the ORR (in the absence of man-made influences). Decreased concentrations that can be noted in 2002 and 2004 occurred after the escalating results were brought to the attention of DOE's contractor. While the results exceeded background measurements, the data indicate concentrations remained below standards prescribed by the Clean Air Act (10 mrem/year).

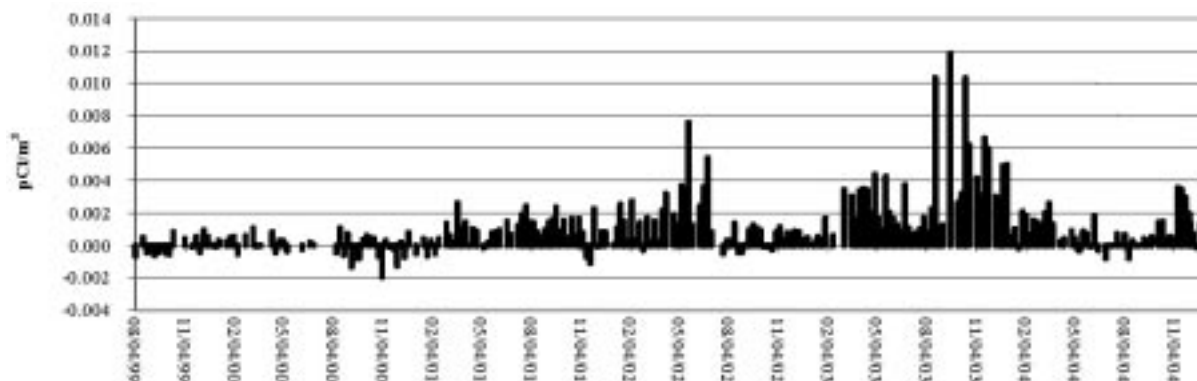


Figure 2. Gross alpha activities reported for air monitoring performed during cleanup of the K-31/K-33 process buildings minus background concentrations collected at Fort Loudoun Dam (08/04/99 to 12/29/04).

Monitoring at the EMWMF and the K-25 process building was initiated in December 2004 and January 2005, respectively. One of the first facilities constructed under the Manhattan Project, the K-25 building is scheduled for D&D in the near future. The K-25 building covers more than 40 acres and is known to be extensively contaminated (as is the equipment inside). The EMWMF was constructed in Bear Creek Valley to dispose of waste generated by CERCLA activities on the ORR. Results received from these two sites, to date, have been consistent with background measurements.

4.0 Oak Ridge Regional Environment

Environmental Radiation Ambient Monitoring System Air Monitoring Program.

Historically, the ERAMS air-monitoring network has been used to track environmental releases of radioactivity from nuclear weapons tests and accidents across the United States. In response to division requests and an initiative to incorporate site-specific monitoring into the program, EPA agreed to locate five of its air monitors on the ORR in 1995. These monitors have been in continuous operation since 1996. In 2004, an ERAMS precipitation sampler was added to a monitoring station located near the HFIR at ORNL.

Samples are collected from each of the ERAMS air monitoring stations twice weekly by division staff and mailed for analysis to EPA's National Air and Radiation Environmental Laboratory in Montgomery, Alabama. The laboratory performs gross beta analysis on each air sample and gamma spectrometry on samples where the beta results exceed 1.0 picocurie per cubic meter. In 2004, none of the gross beta results reported exceeded this screening level. At the time of this report, results for the precipitation samples had not been received.

Radon Monitoring Project. The division began a pilot project in the summer of 2001 designed to assess the feasibility of monitoring radon concentrations over burial grounds on the ORR. Radon, a natural constituent of rocks and soil, is a colorless, odorless, radioactive gas formed by the natural decay of radionuclides in the uranium decay chain. As radon itself decays, daughter radionuclides (polonium-218, polonium-214, bismuth-214, and lead-214) are produced. The radon daughters have a tendency to attach to airborne particles that can become lodged in the lungs when inhaled, damaging the lining of the airways and potentially resulting in cancer. Together, radon and its daughters are believed to be the second leading causes of lung cancer in the United States (the first is smoking cigarettes).

Over the years, more than 40 million pounds of uranium has been disposed in ORR burial grounds.

Over the years, more than 40 million pounds of uranium has been disposed in ORR burial grounds. Although most of this uranium should have been stripped of associated decay products during the refinement process, concentrations of the decay products can be expected to increase as the uranium decays. Consequently, the risk associated with the disposed uranium can be expected to increase with time. While the generation of radon and its daughters is slowed by the long half-lives of intermediary radionuclides in the decay chain, the sheer quantity of uranium that has been disposed on the ORR gave rise to a concern that radon emissions might present a hazard. This is an issue particularly relevant when considering the consequences of leaving thousands of tons of uranium buried on the reservation.

In the summer and fall of 2001, spring of 2003, and winter of 2003 and 2004, staff placed radon detectors over uncapped portions of the Bear Creek Burial Grounds near Y-12 and at background locations in the same geologic formation. After 4 to 5 months in the field, the detectors were collected and shipped for processing. Upon receipt, the

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results were reviewed for consistency, and the data from the burial grounds was compared to the background measurements.

In general, ambient radiation levels follow seasonal trends due to the influence of natural phenomena. With radon, wind movement, precipitation, barometric pressure, and temperature each can play a role in these variations, and relatively large seasonal fluctuations are considered normal. The highest results for the project were reported during the summer months, when radon levels are expected to be at their highest. The results dropped dramatically in the spring and winter sampling events for both the background and burial ground samples, suggesting that the decreases were caused primarily by natural seasonal variations.

In addition to variations expected because of the seasonal changes, one of the burial grounds being sampled was covered by a layer of soil, seeded, and upgraded to a radiological contamination area after the summer of 2001. The soil cover was emplaced to control the spread of uranium wastes discovered on the ground surface by staff deploying the radon detectors during the initial sampling effort. The wastes are believed to be artifacts of a uranium fire and included uranium oxides condensed on rock surfaces, uranium ash, and machine turnings (Figure 3).



Figure 3. Radioactive materials observed in the BG-D East section of the Bear Creek Burial Grounds (Photographs provided by the DOE).

Overall, the data for the burial grounds and the background data were similar in 2001. Two results from the burial ground (57.6 and 32.2 pCi/L) were considerably higher than the other samples, skewing the average concentration for the burial grounds higher than for the background samples. However, the median values remained close (10.7 vs. 10.0 pCi/L), suggesting conditions at the two sites were similar other than the exceptions noted. This pattern was repeated in the results from the spring of 2003, but at much lower levels. The results for the samples taken at the burial grounds in the winters of 2003 and 2004 were consistent with the data reported the previous spring, but the results for the background locations rose slightly above the measurements taken at the burial grounds. It is believed that the soil cap emplaced over the burial ground may have restricted radon movement, reducing the amount of the gas emanating from the burial ground and resulting in the anomalous data.

4.0 Oak Ridge Regional Environment

4.2.2 Ambient Gamma Monitoring (Oak Ridge Reservation-Wide)

Gamma radiation is emitted by various radionuclides that have been produced, stored, and disposed on the ORR since the nuclear era began. Over the years, associated contaminants have spread through many of the facilities and into the environment. To assess the risks posed by these contaminants, the division monitors the dose and dose rates attributable to gamma radiation at selected locations on and near the ORR.

The gamma measurements are taken using environmental dosimeters and continuous dose rate monitors. The dosimeters are used to measure the annual dose an individual could receive from gamma radiation at the monitoring station, if he or she remained at the monitoring station 24 hours a day for a year. The results are compared to the state and DOE maximum dose limit for members of the public (100 mrem/year). Where exposure rates are expected to fluctuate over short periods of time or there is a potential for the accidental release of radioactive contaminants, the dose rate monitors are used to record radiation levels at much shorter intervals (e.g., minutes) than is feasible with environmental dosimeters. The measurements taken by the dose rate monitors are compared to the state's limit for the maximum dose to unrestricted areas (2 mrem in any 1-hour period).

The radiation limits include both external exposures (due primarily to gamma radiation) and internal exposures (due to ingestion, inhalation, injection, or absorption of radionuclides). The division's gamma monitoring program addresses only external exposures. Any contributions to the public dose from internal exposures would be in addition to the doses reported for the program. The actual dose of radiation a person receives from external sources depends on the intensity and duration of the exposure. The annual doses reported in the Ambient Gamma Monitoring Program would be for an individual who remained at the monitoring station for a solid year (8,760 hours). Since this is unlikely, the doses should be viewed as the maximum external dose an individual could receive at each monitoring location.

The monitoring locations and associated results can be roughly organized into the three following categories.

Sites off the ORR. The doses reported for monitoring stations off the reservation (e.g., residential areas) were all consistent with background measurements and well below the 100 mrem/year dose limit for members of the public.

Sites on the ORR Potentially Accessible to the Public. State regulations define a member of the public as any individual other than those who receive an occupational dose of radiation. An occupational dose is defined as the dose to an individual assigned duties involving exposure to sources of radiation during employment. As previously noted, state regulations limit the dose to members of the public and the release of radiation to unrestricted areas. In this context, a restricted area is an area whose access is limited in order to protect individuals from unnecessary exposure to radiation and radioactive materials. It should be noted that the Atomic Energy Act exempts DOE from

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state regulation of radiological materials at its facilities but obligates DOE to regulate these materials in a manner that protects public health and the environment.

Since access to the reservation has in the past been predominantly restricted to employees of DOE or its contractors, locations within the fenced areas of the reservation have traditionally been viewed as inaccessible to the general public. With the reindustrialization and revitalization of portions of the reservation, however, there has been an influx of workers employed by businesses not directly associated with DOE operations. If these individuals are considered members of the general public, several sites within the ORR become problematic. For example, relatively high doses of radiation have routinely been measured in the vicinity of the UF₆ cylinder storage yards at ETP. In 1999, TDEC and DOE entered into a consent order requiring removal of depleted UF₆ cylinders from ETP by December 31, 2009. In 2004, DOE began shipping these cylinders to the Portsmouth Gaseous Diffusion Plant, where the material is to be converted into a form more suitable for use and/or disposal.

Specific Sites within Access-Controlled Areas. While conditions could change, most of the sites monitored that have reported results appreciably above the primary dose limit for members of the public are located within access-controlled areas of the ORR. While it is beyond the scope of this report to address each of these sites individually, several merit comment.

The Cesium Forest. The highest annual doses reported for a number of years have been from dosimeters placed on a tulip poplar tree in ORNL's Cesium Forest. In 1962, a group of trees at this location were injected with 360 millicuries of cesium-137 as part of a study on the isotope's behavior in a forest ecosystem. Based on the dosimetry results, it appears a significant amount of the cesium remains in the trees and local environment. The dose reported for 2004 was 14,801 mrem, which is a little lower than the dose reported for 2003 (15,325 mrem).

Environmental Management Waste Management Facility. The EMWMF was constructed in Bear Creek Valley (near Y-12) to dispose of wastes generated by CERCLA activities on the ORR. The EMWMF relies on a waste profile provided by the generator to characterize waste disposed in the facility. This profile is based on an average of contaminants in a waste lot. Since the size of waste lots are allowed to vary from a single package to many truckloads of waste, the averages reported are not necessarily representative of each load of waste transported to the facility. That is, some loads may have highly contaminated wastes, while other loads may contain very little contamination.

To get an idea of the variability in radioactive waste disposed at the EMWMF, one of the dose rate monitors was secured at the facility's check-in station on August 8, 2002. Each truck transporting waste for disposal is required to stop at this location while the vehicle/waste is weighed and the driver processes the associated manifest. Data from the monitor indicates the dose rate is consistent with background measurements when waste is not in the vicinity of the monitor. As the trucks carrying gamma emitters pull into the

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weigh station, the exposure levels go up, peak as the waste moves past the monitor, then abruptly decline as the trucks pull away. While relatively high measurements can be observed in the data, the elevated readings last only a few minutes. This, coupled with the monitor's inability to read alpha and beta emissions, results in relatively low average values when compared to the maximum exposures measured.

For calendar year 2004, the measurements taken at the EMWMF ranged from 1 to 1,720 $\mu\text{rem}/\text{hour}$ (Figure 4) and averaged 9.25 $\mu\text{rem}/\text{hour}$. The five highest exposure rates recorded in 2004 were taken during the delivery of radioactive wastes associated with the Corehole 8 remediation at ORNL. The highest of these values, 1,720 $\mu\text{rem}/\text{hour}$, represents approximately 86 percent of the state maximum dose to an unrestricted area in any 1-hour period.

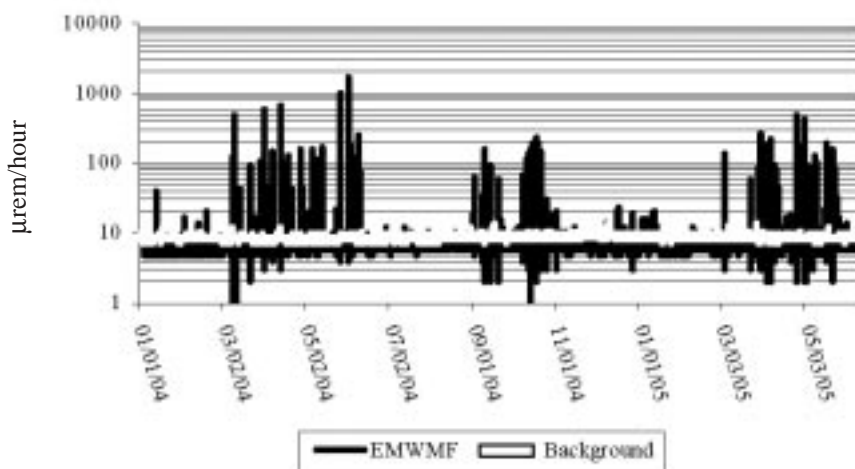


Figure 4: 2004 and 2005 Results of gamma exposure rate monitoring at the weigh-in station for the Environmental Management Waste Management Facility. The state dose limit to an unrestricted area is 2 mrem (2,000 μrem for gamma) in any 1-hour period. The state dose limit for members of the public is 100 mrem in a year.

4.2.3 Air Pollution Control

Review of Permitted Air Emissions Sources. The division conducted periodic reviews of air permitting documentation for ETTP, ORNL, and Y-12. Division staff assisted with the file review for the annual TDEC Division of Air Pollution Control inspection at ETTP.

Oversight of Asbestos Management and Removal. The division continued oversight of asbestos management and removal on the ORR to ensure compliance with air pollution control and solid waste management regulations.

Air Pollution Monitoring for Heavy Metals. In 1997, the division established an independent monitoring effort to identify overall levels of hazardous pollutants in the air

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on and around ETTP. The division established comparable air monitoring programs at ORNL and Y-12 in calendar year 1999. High-volume samplers are operated at these sites, and samples are collected and analyzed at the state environmental laboratory in Nashville for the following selected heavy metals: arsenic, beryllium, cadmium, chromium, lead, nickel, and uranium as a metal. During the past year, changes in the program have been initiated to facilitate comparisons of future data collected by the division with heavy metal data collected by DOE at ETTP.

4.3 SOIL AND SEDIMENT QUALITY

4.3.1 Sediment

The division's Environmental Monitoring and Compliance Program samples sediments at 34 sites, with 11 on the Clinch River and two on the Tennessee River. The other 21 sites are located on tributaries of the Clinch River draining from the ORR; these are considered exit pathways. None are on a stream, such as White Oak Creek or Poplar Creek, that has already been identified as contaminated and that is currently monitored by DOE.

Samples were analyzed for organic, inorganic, and radiological contaminants. The results were compared with standards, known as Preliminary Remediation Goals, established for the ORR based on guidance from EPA. These standards were used because there are no regulatory guidelines for sediment quality, either at the state or federal level. The sediments met the standards for recreational use, meaning that people can safely engage in activities such as fishing, hiking, and playing at these locations.

4.3.2 Radiological Field Surveys

Currently the division is monitoring Reeves Road, which is a haul road that carries radioactive waste over Chestnut Ridge from ORNL to the EMWMF. A sodium iodide unit (gamma detector) is utilized during this survey. To date, no elevated readings or staining on the road were observed to warrant the use of additional instrumentation. The road is surveyed bimonthly.

4.4 FOOD AND WILDLIFE QUALITY

4.4.1 Environmental Biomonitoring and Oversight

The ORNL Biological Monitoring and Abatement Program (BMAP), a joint program of DOE and its contractor UT-Battelle, examines the effects of DOE-related activities on the ORR and the surrounding community by studying various organisms on land and in streams originating on the ORR. Studies include aquatic toxicity testing, bioaccumulation monitoring, the use of biological indicators, and in-stream ecological monitoring of fish and benthic macroinvertebrate communities. These projects help define the overall health of a system by assessing its biotic integrity, identifying possible sources of ecological damage, and determining the effectiveness of DOE remediation efforts. BMAP sampling efforts have established a large database of information

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spanning nearly 2 decades. BMAP oversight activities and independent sample monitoring by the division provide a means of assessing the integrity of results obtained and assessments made by BMAP personnel. They also provide an independent analysis of the sampling locations.



TDEC photo

Division personnel oversee fish processing procedures conducted by ORNL BMAP personnel. The K-1007-P1 Holding Pond ecological sampling event supports the ETTP Sitewide Remedial Investigation.

The Environmental Restoration Support Section of the Radiological Monitoring and Oversight Program continued analysis of the independent biological monitoring project during FY 2005. The project involves sampling and monitoring of aquatic vegetation on the ORR, using species such as watercress and green algae as indicators of radiological and metals contamination bioaccumulated from groundwater (environmental stressors). Habitats monitored included springs, seeps, spring tributaries, East Fork Poplar Creek, and background locations. There is evidence that the vegetation is accumulating radionuclides, especially beta-emitters, from the groundwater. The measurements suggest that the degree of aquatic vegetation contamination correlates to

groundwater contaminant concentrations. The division will continue to sample and monitor aquatic vegetation both off site and on the ORR to monitor aquatic ecosystem health and stream recovery.

4.4.2 Milk Sampling

The division's Environmental Monitoring and Compliance Program oversees DOE's milk sampling program for the areas surrounding the ORR. Contractors for DOE and UT-Battelle take samples of milk from two locations in the vicinity of the ORR and one background location in Maryville and analyze them for radiological contamination. The data show that milk from the sampling area is not contaminated.

4.4.3 Vegetable Sampling

The division's Environmental Monitoring and Compliance Program oversees DOE's vegetable sampling program for areas around the ORR. DOE contractors purchase lettuce, tomatoes, and turnips from area gardeners for radiological analysis. There are six sampling sites: three in Oak Ridge, one between Kingston and Oak Ridge, one between Lenoir City and Oak Ridge, and one in the Claxton community. The data show no radiological contamination in the vegetables.

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4.4.4 Fish

Division personnel conduct annual inspections of signs that advise the public against fish consumption and water contact in waters that have been or could be impacted by DOE operations. The advisory posting program is part of a larger, more encompassing sign-posting and inspection project coordinated by the TDEC Environmental Field Offices in Knoxville and Chattanooga.

The division focuses its efforts on waters within and surrounding the ORR. Areas of responsibility include the Clinch River and Melton Hill Lake above Melton Hill Dam, as well as Watts Bar Reservoir, including the Lower Clinch River, Tennessee River, and Lower Tennessee River arms. The advisory postings include warnings against consumption of catfish, striped bass, and Cherokee bass (striped bass/white bass hybrid). Precautionary postings warn certain groups of individuals (children, pregnant women, and nursing mothers) not to eat any of the listed fish. All others are warned to limit their consumption to about two meals per month. Fish included on precautionary signs are white bass, sauger, carp, smallmouth buffalo, and largemouth bass.

Posting inspections are also conducted along East Fork Poplar Creek from the Y-12 Bear Creek Road entrance to the most western point at which Oak Ridge Turnpike crosses the stream. Signs have been placed along this portion of East Fork Poplar Creek, effectively covering the residential areas of Oak Ridge. Newer postings warn against swimming, wading, and fishing, while older signs warn against general water contact.

The division conducted this year's annual sign posting inspections from March 14–29.

The division is currently participating in a joint effort with the TDEC Division of Water Pollution Control, TVA, and ORNL to sample fish on Watts Bar Reservoir and analyze the tissue to determine if current postings need to be revised. TVA and ORNL are collecting the fish, and the division will conduct analysis. The data will be given to the Division of Water Pollution Control for evaluation of current postings.

4.4.5 Aquatic Life

During spring 2005, division personnel conducted oversight trips in conjunction with ORNL BMAP fish and benthic macroinvertebrate sampling events. Established scientific sampling protocols and techniques were followed, and no concerns were noted.

The division conducts an independent assessment each year of benthic macroinvertebrate communities in streams on the ORR and off site. Most sampling sites overlap the BMAP sites and allow general comparison between results. The division has adopted the Division of Water Pollution Control Standard Operating Procedures for macroinvertebrate stream surveys. This method uses a semiquantitative approach and assesses the biotic integrity of a stream based on specific criteria developed for the unique region, or “ecoregion.” Results from the 2005 spring sampling event will be published in the 2005 Environmental Monitoring Report, which will be available in

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Current Fish Advisories

Stream	County	Portion	Pollutant	Comments
East Tennessee				
Boone Reservoir	Sullivan, Washington	Entirety	PCBs, chlordane	Precautionary advisory for carp and catfish.*
Chattanooga Creek	Hamilton	Mouth to GA line	PCBs, chlordane	Fish should not be eaten. Avoid contact with water also.
E. Fork of Poplar Creek, incl. Poplar Creek embayment	Anderson, Roane	Mile 0.0-15.0	Mercury, PCBs	Fish should not be eaten. Avoid contact with water also.
Fort Loudon Reservoir	Loudon, Knox, Blount	Entirety (46 miles)	PCBs	Commercial fishing for catfish prohibited by TWRA. Catfish, largemouth bass over two pounds, or any largemouth bass from the Little River embayment should not be eaten.
Melton Hill Reservoir	Knox, Anderson	Entirety	PCBs	Catfish should not be eaten.
Nickajack Reservoir	Hamilton, Marion	Entirety	PCBs	Precautionary advisory for catfish.*
N. Fork Holston River	Sullivan, Hawkins	Mile 0.0-6.2	Mercury	Fish should not be eaten. Advisory goes to TN/VA line.
Tellico Lake	Loudon, Monroe	Entirety	PCBs	Catfish should not be eaten.
Watts Bar Reservoir	Roane, Meigs, Rhea, Loudon	TN River portion	PCBs	Catfish, striped bass, and hybrid striped bass should not be eaten. Precautionary advisory* for sauger, carp, smallmouth buffalo, white bass, and largemouth bass.
Watts Bar Reservoir	Roane, Anderson	Clinch River arm	PCBs	Striped bass should not be eaten. Precautionary advisory for catfish and sauger.*
Middle Tennessee				
Woods Reservoir	Franklin	Entirety	PCBs	Catfish should not be eaten.
West Tennessee				
Loosahatchie River	Shelby	Mile 0.0-20.9	Chlordane	Fish should not be eaten.
McKellar Lake	Shelby	Entirety	Chlordane	Fish should not be eaten
Mississippi River	Shelby	MS line to mile 745	Chlordane	Fish should not be eaten. Commercial fishing prohibited by TWRA.
Nonconnah Creek	Shelby	Mile 0.0-1.8	Chlordane	Fish should not be eaten. Advisory ends at Horn Lake Road bridge.
Wolf River	Shelby	Mile 0.0-18.9	Chlordane	Fish should not be eaten.

* Precautionary Advisory: Children, pregnant women, and nursing mothers should not eat the fish species named. All other persons should limit consumption of the named species to one meal per month.

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early 2006. Results from any prior year's independent sampling events can be found in that year's Environmental Monitoring Report.

Surface water samples were collected twice in 2004–2005 at all benthic macroinvertebrate sampling sites. Samples were analyzed for nutrient, microbiological, mercury, metal, radiological, and routine (residue and hardness) constituents. Sampling was conducted in support of the benthic sampling and provides a snapshot of stream water conditions. Results of the surface water sampling efforts can be obtained from division Environmental Monitoring and Compliance personnel.

4.4.6 White-Tailed Deer

Division personnel monitor results from the fall deer hunts conducted on the ORR. The annual deer hunts began in 1985 as a method of population control. The most prevalent contaminants found in the deer are cesium-137, a gamma emitter known to accumulate in body tissue, and strontium-90, a beta emitter known to accumulate in bone. Deer are a bioindicator of the effectiveness of the overall cleanup program. Three weekend hunts were conducted in 2004, on November 13–14, December 4–5, and December 18–19. Of 342 deer taken in the hunts, 10 (or 2.9 percent) were retained. Hunt data can be obtained from division Environmental Monitoring and Compliance personnel or online at www.ornl.gov/rmal/huntinfo.htm.



This buck was among the 10 deer confiscated during the December 2004 hunt on the ORR. TDEC photo

4.4.7 Canada Geese

In 1998, numerous geese were collected from ORNL and found to have levels of contamination above the administrative release level of 5pCi/g. The division initiated an off-site collection to ascertain whether contaminated geese were traveling off the reservation. To date, no contaminated geese have been found off the ORR.

Past studies conducted by ORNL personnel have shown that a small proportion of Canada Geese residing at ORNL may become contaminated. Consequently, an annual goose roundup is conducted at ORNL, locations near ETP and Y-12, and other sites on the ORR. Geese are collected and scanned to determine if they are contaminated by radionuclides and other hazardous contaminants. Since 1991, this has been a cooperative project between the Tennessee Wildlife Resources Agency, DOE, BMAP teams, and division staff.

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The 2004 goose roundup was conducted on June 24-25. The 2005 roundup was conducted on June 23-24.

In the 2005 roundup, Canada Geese were collected from four separate locations on and around the ORR. A total of 295 geese were collected from the locations shown in Table 2. None had levels of contamination above the administrative release limit of 5 pCi/g.

Table 2. 2005 Goose Roundup Results

Site	Date	# Captured	Adults	Juveniles	# > 5 pCi/g
ORNL	6/23/05	117	82	35	0
ETTP	6/24/05	126	117	9	0
Clark Center Park	6/24/05	44	44	0	0
Y-12	6/24/05	8	6	2	0
Totals		295	249	46	0

4.4.8 Wild Turkey

Two managed weekend hunts on the ORR are open to the public annually. In 2005, turkey hunts were held on April 9-10 and April 16-17. One turkey was retained due to internal radiological contamination (April 16-17), having been screened at three times the background level of strontium-90. This brings the total number of turkeys retained to three since the managed turkey hunts began. The other two turkeys were retained in 1997 and 2001 due to slightly elevated strontium readings. The administrative release criteria are 20 pCi/g for bone tissue and 5 pCi/g for whole body count.

4.4.9 Clinch River Fish Sampling

ORNL personnel conduct biological monitoring in the Clinch River to examine potential exposure to the public from the consumption of contaminated fish. Sunfish and catfish are collected annually at designated test sites and reference locations in the river. Fish fillets are analyzed for metals, pesticides, PCBs, cobalt-60, cesium-137, and total radioactive strontium. Oversight activities were conducted in June 2005 at various locations on the Clinch River. No concerns were noted.

4.4.10 Threatened and Endangered Species

Division personnel conduct evaluations on threatened and endangered plant and animal species on the ORR in support of the TDEC Division of Natural Heritage. Field surveys are conducted and report documents are reviewed as needed. The division keeps an inventory of those plant and animal species that are on the state and EPA lists for surveillance. Field botany surveys were conducted on the Blackoak Ridge Conservation

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Easement to identify potential populations of threatened and endangered plant species. Although populations of species like Pink Lady Slipper (*Cypripedium acaule*) and Ginseng (*Panax quinquefolia*) were found on the easement, these are not federally listed species and, as such, are not required for inclusion in bioassessments, according to the TDEC Division of Natural Heritage. In addition, division staff participated in several ecology field walkdowns of remediation sites at ETTP to determine the presence of any threatened and endangered species prior to tree clearing, etc.



Contractors work on the remediation of SWSA 5, expected to be complete in fiscal year 2006. TDEC photo

5.0 Key Challenges

Following is a summary of key challenges facing DOE, the community, and the state.

5.1 GROUNDWATER MANAGEMENT STRATEGIES

The CERCLA remedial action strategy at Oak Ridge has long been to focus on sources of contamination—burial grounds, spill sites, leaking tanks, contaminated soils—before turning to contaminated groundwater. This strategy remains valid and is reflected in the types of RODs that have been put in place over the past decade. However, cleanup of contaminated groundwater will be difficult due to the complex geology and hydrology of the ORR. The present strategy is to attack sources first and then institute groundwater remedies specific to individual problems, but some problems may not have definitive solutions by the time decisions must be made. In some cases, groundwater can be remediated using traditional methods, such as pump-and-treat systems; in other cases, new technologies will be applied. In either case, remedies will likely take many years to return groundwater to a safe, usable condition. DOE must have adequate long-term stewardship and institutional controls in place to assure continued protectiveness to the environment and human health.

5.2 LONG-TERM STEWARDSHIP RESPONSIBILITIES

Contamination, both hazardous and radioactive, will remain on the ORR for many years, long after the cleanup program has come to a close. As a result, long-term risk to the public and the environment will remain unless active care and monitoring of this contamination is maintained. The state is requiring that DOE ensure adequate funding for this care, independent of annual appropriations from Congress. If it is to be effective, long-term stewardship must also be accompanied by improvements in record keeping, enforcement, surveillance, maintenance, monitoring, and funding. Although DOE has a Stewardship Plan, it has yet to produce an acceptable Stewardship Implementation Plan and commit the resources necessary to ensure long-term protection.

One positive step toward long-term stewardship has been taken by the DOE Oak Ridge Site Specific Advisory Board. The board developed and provided a stewardship education kit to local high schools, allowing future stewards to get involved in protecting future generations from residual contamination.

5.3 THE FEDERAL COMMITMENT

DOE, EPA Region 4, and the state have signed an Oak Ridge Accelerated Cleanup Plan Agreement. The accelerated cleanup program will complete the closure of ETTP, undertake interim actions in Melton Valley to cap historical disposal sites and control the spread of contamination in the groundwater, and complete other high-risk projects on and off the ORR by 2008. The plan calls for all stored legacy waste from the Oak Ridge site to be disposed by 2005 and CERCLA cleanup at Oak Ridge to be completed by 2016. If this plan is successful, it will reduce cost by an estimated \$2 billion-plus and accelerate completion of the Environmental Management program by 5 years. Adequate

5.0 Key Challenges

annual funding is imperative to achieving agreed goals. The ORR cleanup budget for FY 2005 was \$543 million. The FY 2006 request for cleanup funding is \$531 million.

Since the terrorist attacks of September 11, 2001, many formerly public documents, including environmental plans and reports, have been categorized as “Official Use Only” due to security concerns. This has resulted in “redaction” of maps and references to strategic facilities or materials in versions certified as suitable for public release. The state does not hold records designated as Official Use Only because it cannot, by law, keep them from public access. The state reviews Official Use Only and classified documents in designated DOE facilities. If available, redacted copies are kept in state files. However, this increased security has limited access by the general public to important environmental information freely released in the past. This causes concern about maintaining effective public input into NEPA and CERCLA decisions.

The SNS is quickly approaching operations without published plans to manage waste and monitor the environment. This new science facility is a source of pride to ORNL and to the local community. However, radioactive materials and wastes will be produced in significant quantities. DOE must remain committed to the safe and efficient operation of the SNS to assure the environmental monitoring and waste management requirements for the facility are compliant with DOE Orders.

5.4 CHARACTERIZATION AND DISPOSAL OF RADIOACTIVE WASTE

One obstacle to completing accelerated cleanup is the characterization and disposal of stored radioactive waste, which DOE self-regulates. This waste is physically in the way of cleanup activities; administratively, the accelerated plan cannot be considered finished until this waste is characterized and properly disposed. While DOE has made strides in disposition of its stored radioactive waste, several issues remain.

Under the terms of the Closure Contract, DOE had obligated environmental management contractor Bechtel Jacobs Company LLC to disposition legacy waste by the end of FY 2005. The term “legacy” refers to waste that was in DOE Environmental Management program inventories before September 30, 2000, when waste was formally inventoried and categorized, coinciding with the effective date of DOE Order 435.1.

A special category of legacy low-level waste, “grandfathered waste,” is a waste certified to former waste handling acceptance requirements and requires incremental characterization for disposal.

Based on the assumption that responsibility for waste would be transferred from the Environmental Management program to generators for the disposition of newly generated waste, the Environmental Management program set a deadline for acceptance of NNSA grandfathered waste. The transfer of this responsibility continues to be a moving target, and NNSA continues to store inventories of grandfathered waste. DOE must find an administrative pathway for the proper characterization and disposition of this subset of legacy low-level waste.

5.0 Key Challenges

Mixed waste has both radioactive and hazardous components. Although DOE is self-regulating in the area of radioactivity, states regulate the hazardous constituents in wastes. Because Tennessee has this authority, it has been able to negotiate milestones and targets with DOE for characterization, treatment, and disposal of mixed low-level and mixed TRU wastes under the Federal Facilities Compliance Act Site Treatment Plan. In general, understanding the composition of mixed wastes and funding their treatment and disposal are bottlenecks for moving these wastes out of storage and off the ORR. DOE must make disposition of the remaining “non-legacy” mixed waste a higher priority to comply with the Tennessee Site Treatment Plan.

Some especially dangerous wastes now stored at ORNL do not yet have a permanent disposal site. Known as remote-handled transuranic (TRU) wastes, they must wait until the Waste Isolation Pilot Plant (WIPP) receives a permit from the state of New Mexico allowing this waste to be accepted. The ORR has DOE’s largest inventory of this waste destined for disposal at WIPP. As a result of the permit delay by New Mexico regulators, the state and DOE have had to renegotiate Site Treatment Plan schedules for this waste in Oak Ridge. DOE has requested that the TRU waste milestones be removed from the Site Treatment Plan. TDEC has denied the request, and DOE has disputed the state’s decision. The matter remains under dispute.

DOE manages two important facilities for management of mixed wastes on the ORR, both of which have generated concerns for the state:

1. The TSCA Incinerator burns mixed waste contaminated with PCBs. At the same time that federal sites in other states want to use the TSCA Incinerator to dispose of wastes, DOE cannot work off the local waste inventory. The TSCA Incinerator is now expected to operate beyond 2008.
2. The Environmental Management Waste Management Facility (EMWMF) was built on the ORR to dispose wastes produced during cleanup of the Oak Ridge sites. A TDEC audit of Melton Valley wastes disposed in the EMWMF revealed the need for closer inspection of wastes slated for disposal. EMWMF has strict rules regarding what wastes it will accept, and the state wants to be sure that these rules are being followed. Long-term management of wastes that are left in place under engineered caps, as well as wastes disposed at EMWMF, will remain a concern for the foreseeable future.

5.5 INCORPORATING HISTORIC PRESERVATION INTO CLEANUP ACTIVITIES

The ORR is home to three Manhattan Project-era plants designated by DOE as “Signature Facilities.” These are the Graphite Reactor at ORNL, the Beta 3 Calutron Racetrack at Y-12, and the U-shaped K-25 gaseous diffusion building at ETP. Although the initial plan under the Accelerated Cleanup Program was to demolish the K-25 building, a memorandum of understanding was negotiated requiring preservation of the north end of the “U” with cleanup to free-release industrial standards. Still to be

5.0 Key Challenges

determined is how to preserve and decontaminate examples of the gaseous diffusion equipment.

Other buildings in ORR historical districts have been or are slated for demolition. Coordination with the Tennessee Historical Commission, an office of TDEC, ensures that the lessons of the Manhattan Project are not lost for future generations. Although environmentally hazardous facilities must be demolished and contaminated debris disposed, selected artifacts will be preserved, and buildings will be photographed and documented.

5.6 EMERGENCY RESPONSE PREPAREDNESS

TEMA and state and local jurisdictions must stay prepared in case of an environmental release from the ORR. The division is responsible for coordinating all environmental monitoring in public emergency planning zones. This includes preparedness for the division's own field monitoring teams as well as coordination with TEMA to direct sampling and monitoring assets from DOE and other agencies. This is true not just for accidents, but also for intentional acts of terrorism. Under the National Response Plan, states and local governments are responsible for determining cleanup levels. The division participated in a dirty bomb exercise for Y-12 in 2004 and in an exercise focusing on the release of an alpha-emitting isotope from ORNL in 2005. The division also must provide TDEC backup in case the main State Emergency Operations Center goes off line.

DOE continues to face the challenge of communicating emergency information in a timely manner to participants in its exercises, especially to the media and for citizen notification. The current system of multiple review prior to information being released from the Joint Information Center is cumbersome and will not function effectively in case of a real emergency.

5.7 DIFFICULT CLEANUP DECISIONS

DOE is moving forward with the remediation of sites where there is broad agreement between the FFA parties as to what actions need to be taken. Two particularly problematic sites remain: (1) the Bear Creek Burial Grounds and (2) sediments in White Oak Lake and embayment. Preliminary discussions indicate that DOE and the division are yet far apart on what would be considered an acceptable remedy for these highly contaminated areas.

6.0 Health Studies & Emergency Response

6.1 HEALTH STUDIES

Concerns have been raised for years concerning contaminants from the ORR and health problems they may have caused for workers on site and for nearby residents.

Several government agencies have moved to address these concerns, through energy-related research, health-related studies, and public health activities centered on the ORR. These activities have been conducted by the National Center for Environmental Health, the National Institute for Occupational Safety and Health, the Agency for Toxic Substances and Disease Registry (ATSDR), the Centers for Disease Control and Prevention (CDC), and the Tennessee Department of Health.

Health studies and assessments already conducted or ongoing in Oak Ridge are grouped into three main areas:

- Off-site contamination,
- Community health studies and activities, and
- Workers health studies.

6.1.1 Oak Ridge Reservation Health Effects Subcommittee

ATSDR and other CDC agencies established an Oak Ridge Reservation Health Effects Subcommittee made up of a knowledgeable and representative group from the Oak Ridge area. The subcommittee is a federal advisory committee that provides advice and recommendations to the CDC and ATSDR about the agencies' off-site public health activities and research at the ORR. The funding is expected to be eliminated from the DOE budget for fiscal year 2006, and so the subcommittee will end its work in September 2005.

Subcommittee members seek to involve those who are interested in and affected by ATSDR and CDC public health activities at the ORR. There have been numerous meetings, presentations, discussions, workgroup activities, and various completed and ongoing projects since ATSDR established the subcommittee in 1999. As ATSDR concludes its efforts, these activities should result in an increased local emphasis on environmental medicine. The health concerns of exposed individuals can be addressed through clinical intervention combined with health education.

The division is represented by a liaison who is a non-voting member of the subcommittee. The role of the liaison is to provide the subcommittee and the federal agencies with requested information regarding contamination on and off the ORR.

6.0 Health Studies & Emergency Response

The public health assessment is the primary process ATSDR uses to evaluate the potential impact of ORR hazardous releases on the health of nearby communities. ATSDR has completed and released one public health assessment on Y-12 uranium releases. Two assessments have completed public comment and peer review periods: the TSCA incinerator and White Oak Creek radionuclide releases. The off-site groundwater public comment and peer review period is in progress. Other assessments are undergoing internal ATSDR review, including K-25 uranium and fluoride, the screening of current exposures, iodine-131, and PCBs. Mercury public health assessment data validation is in progress.

6.2 EMERGENCY RESPONSE

6.2.1 Tennessee Emergency Management Agency

TEMA is the state's emergency management arm. Located within the Military Department of Tennessee, TEMA provides technical assistance, supplies, equipment, and training to local governments. The agency also administers funding from the state and federal governments.

TEMA operates a 24-hour emergency operations center. This center manages emergency information and coordinates state and federal assistance from one location.

Under the TOA, DOE is required to provide technical and financial assistance for emergency response. TEMA is the primary state agency responsible for implementing the following provisions:

- Developing and maintaining the state's Multi-Jurisdictional Emergency Response Plan for ORR facilities in accordance with federal laws and regulations;
- Organizing and participating in annual emergency response exercises and drills with affected state agencies and local governments;
- Training state and local government employees and officials, as well as volunteers who may be called upon in the event of an emergency at the ORR; and



Division Field Monitoring Team members compare background air sample results during ORNL's Emergency Response Exercise in July 2005.

TDEC photo

6.0 Health Studies & Emergency Response

- Acquiring and maintaining equipment—with funds provided by DOE—for TEMA and affected counties to support the Emergency Response Plan.

TEMA is responsible for emergency response planning and training. During the last year, several division staff attended basic radiological emergency response training provided by TEMA. For some new staff members it was their initial training, while for others it served as a refresher for training taken years before. Staff members also attended the monthly Emergency Services Coordinator meeting in Nashville via teleconference at the TEMA East facility in Alcoa. This allows for better participation by division staff at a savings of both travel time and money. Staff members were also deeply involved in planning the annual DOE emergency response exercises. This participation was especially important, as several new procedures, methodologies, and technologies were instituted during the exercises. Division personnel were instrumental in developing and fine-tuning these new procedures and technologies. The Emergency Response Plan is the basic plan that describes general concepts that guide the off-site response to an emergency at the ORR. This plan is shared with emergency response organizations in Anderson, Knox, Loudon, and Roane counties. It provides the purpose, scope, and execution of the plan; the state's mission; assignment of emergency responsibilities and actions; and descriptions of the major emergency response organizations.

6.2.2 TDEC DOE Oversight Division

The division maintains the capability to respond to environmental emergencies and supports TEMA in technical issues that may result from DOE activities in Oak Ridge. The division is constantly accessible to TEMA through the use of a dedicated duty person and a 24-hour paging system.

The division participates each year in a series of exercises in Oak Ridge. These exercises involve DOE, TEMA, and local agencies from Anderson, Knox, Loudon, and Roane counties. In 2005, the emergency exercises involved ORNL. Exercises were held in April and May 2005. The graded full participation exercise is scheduled for July 20.

In an emergency or exercise, the division maintains and fully staffs the Environmental Monitoring Control Center and Environmental Field Monitoring Teams. The Environmental Monitoring Control Center is located at the TEMA East facility in Alcoa. The Environmental Field Monitoring Teams are dispatched from Alcoa. In addition, the division supplies a staff member to the Field Coordination Center. The division also supplies a staff member to DOE's Joint Information Center in the Powell community of Knox County. The division supports TEMA through development of a system to track and evaluate reportable occurrences at the ORR. Daily occurrence reports are sent to the division.

7.0 Outreach

The division conducts public outreach at the local, state, and national levels. By attending public meetings to make presentations and act as an information resource, the division helps the public learn about the ORR's environment. The division's local and state activities are included under the TOA. Its national activities include membership in a variety of programs and initiatives. The division also maintains a World Wide Web site with detailed information about ORR environmental issues at <http://www.state.tn.us/environment/doeo/index.html>.

Other community organizations that monitor DOE activities in Oak Ridge also seek to include the public in their work. In addition, DOE has an extensive outreach program to solicit public input on environmental concerns, and the agency has established an information center to give stakeholders direct access to relevant documents.

Outreach programs enable the public to play a meaningful role in environmental decision-making. Following are the major public outreach efforts undertaken by a variety of organizations concerned with DOE's Environmental Management program at Oak Ridge. Contacts for local and state initiatives—including addresses, phone and fax numbers, and Web sites—are listed in the appendix.

7.1 TDEC DOE OVERSIGHT DIVISION

7.1.1 Local and Regional Activities

The division works with the following local or regional organizations regarding issues associated with the ORR:

- Watts Bar Interagency Group (see sidebar)
- Tri-State Depleted UF₆ Working Group
- Oak Ridge Reservation Health Effects Subcommittee (see Section 6.1.1)
- Oak Ridge Reservation Local Oversight Committee, Inc. (LOC)
- Oak Ridge Site Specific Advisory Board
- Public schools and other institutions in the surrounding region

As an example of local outreach, the division set up a display and answered questions at the United Methodist Church in Oak Ridge for the 2005 Earth Day celebration.

The Watts Bar Interagency Working Group Agreement allows federal and state agencies to coordinate their review of activities at Watts Bar Reservoir, specifically those that may disturb sediments that have been or may have been contaminated by DOE releases in Oak Ridge. In particular, the agreement looks to permitting and other use authorization by the U.S. Army Corps of Engineers and TVA, with these agencies reviewing proposed activities with DOE, TDEC, and EPA. The agreement does not limit the authority of any of these agencies; instead, it allows the group to collect and review relevant data and make a joint recommendation to the permitting agencies for consideration during the permitting decision.

7.0 Outreach

7.1.2 National Activities

At the national level, division staff members participate in a wide range of initiatives that may affect the ORR, the Oak Ridge community, or the state. These initiatives include involvement in the following groups:



TDEC photo
TDEC personnel provide information at the United Methodist Church Earth Day celebration.

Interstate Technology and Regulatory Council.

The council was formed in 1995 as a multi-state coalition working to achieve regulatory acceptance of innovative environmental technologies. The state-led council became affiliated with the Environmental Council of States in 1999 and has been working closely with that organization to promote the examination of innovative technology for conducting more cost-effective and efficient site cleanups. The Radiological Monitoring Section representative for the state has worked with the council to create cleanup levels for radionuclides in soils. A training workshop has been established on the Internet. The group is in the process of

publishing *Real Time Data Collection for Radionuclides*. In addition, training on the Internet for this topic is in the works and should be ready by early FY 2006.

The National Governors Association Federal Facilities Task Force. This task force provides a forum for open and effective dialogue between DOE host states and DOE officials on a wide array of technical, budget-related, and policy issues arising from the DOE's cleanup efforts in the states. Current issues are the 2006 budget request, a national strategy for waste management, legacy management at closure sites, and natural resource damage assessment.

The National Conference of State Legislatures' State and Tribal Government Working Group. The State and Tribal Government Working Group is a forum in which all tribes affected by DOE sites can interact directly with the states and DOE. Major interest areas for FY 2005 were the transportation of waste through states and tribal lands, environmental justice, and long-term stewardship of contaminated property.

The Association of State and Territorial Solid Waste Management Officials' Radiation Focus Group. This organization tracks radiation-related issues that could affect EPA region states. The focus group gets regular updates and provides comments to the U.S. Army Corps of Engineers, DOE, the Nuclear Regulatory Commission, and EPA. The group has an emphasis on federal facility issues and has cooperative projects with the Council of Radiation Program Directors, The Health Physics Society, and the American National Standards Institute.

The Tri-State (Tennessee, Kentucky, and Ohio)/DOE Depleted Uranium Hexafluoride Working Group. This group has meetings and weekly conference calls

7.0 Outreach

to work out details of the shipment of UF₆ cylinders from ETTP to Portsmouth, Ohio. It has evolved from a small group of mid-level environmental managers to include a larger contingency of legal, policy, emergency response, law enforcement, and DOE UF₆ cylinder staff. This group has existed since 1997. Due to the efforts of this group, over 3,850 cylinders have been shipped as of June 30, 2005.

Division activities also include participating as Tennessee's representative during the DOE intergovernmental group's Risk-Based End States Next Steps Workshop.

7.2 OAK RIDGE RESERVATION LOCAL OVERSIGHT COMMITTEE

Representatives from the division participate in meetings of the LOC, an organization chartered under the TOA. The LOC's mission is to ensure that the best interests of member communities are protected and that public funds are used wisely during cleanup, continued operation, and reindustrialization at the ORR. The LOC is governed by a board of directors, which includes local elected and appointed officials from the city of Oak Ridge and the counties of Anderson, Roane, Knox, Loudon, Meigs, Rhea, and Morgan. Board members are concerned with human health and the environment, emergency management issues, and any impacts on their communities' economic and social well being.

The board is advised by a Citizens' Advisory Panel (CAP), which was created in early 1995 to provide advice based on in-depth reviews of DOE documents and studies of community concerns. CAP meetings often begin with presentations by experts on issues of current interest to the greater Oak Ridge community.

CAP members attend meetings of other organizations concerned with environmental, economic, and health issues in order to better evaluate the range of stakeholder opinions. The CAP regularly transmits public concerns to the LOC Board and to DOE, EPA, and various divisions within TDEC.

In the past year, issues addressed by the LOC and the CAP have included the following:

- Accelerated cleanup impacts on future land use and reindustrialization,
- How to best implement long-term stewardship of remediated sites and ensure effective DOE coordination with local governments,
- Historic preservation of a portion of the K-25 building on the ORR and its appropriate integration with cleanup planning and activities,
- The effectiveness of DOE emergency response planning, as demonstrated by drills and responses to actual events,
- Capacity and use of EMWMF for various cleanup wastes,
- Construction of a dedicated haul road for transportation of wastes to EMWMF from ETTP, and
- Political issues related to the decision-making process for waste disposal, especially UF₆ cylinders and TRU waste.

LOC outreach efforts include a periodic newsletter, *Insights*, presentations to community groups and governmental entities, an e-mail news list, and an Internet presence at <<http://www.local-oversight.org>>.

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The LOC is staffed by an executive director and an administrative assistant. For further information about the LOC or to be added to the newsletter mailing list, contact Susan Gawarecki in Oak Ridge by phone at (865) 483-1333, toll free at (888) 770-3073, or by e-mail at loc@icx.net.

7.3 LOCAL GOVERNMENT ENVIRONMENTAL BOARDS

7.3.1 Oak Ridge Environmental Quality Advisory Board

The Oak Ridge Environmental Quality Advisory Board is an official board of the city of Oak Ridge. Its members are appointed by the City Council, and the board, in turn, advises the City Council on environmental issues. Because the ORR is predominantly within the city limits of Oak Ridge, one of the board's primary functions is to review and comment on DOE cleanup activities that potentially affect the city. The board's Web site is found at <http://orserv01.ci.oak-ridge.tn.us/eqab>.

7.3.2 Roane County Environmental Review Board

Members of this official Roane County governmental board are appointed by the county executive and confirmed by the County Commission. The board advises both the county executive and the commission on environmental matters, including those resulting from the presence of two major ORR facilities—ORNL and ETP—in Roane County. Roane County continues to attract commercial waste management firms interested in doing business with DOE and outside clients. In addition, three incinerators on or near the ORR are situated within county boundaries. The east end of Roane County will have a variety of DOE-related cleanup, waste management, and transportation issues to monitor for years to come.

7.4 DOE PUBLIC INVOLVEMENT

DOE works with TDEC and EPA to foster public involvement in environmental remediation decision-making. Opportunities may include informal conversations, electronic communications, scheduled meetings and workshops, legally required permit hearings, and participation in meetings of the Oak Ridge Site Specific Advisory Board.

Some portions of DOE's public involvement program are required under CERCLA and specified in the FFA. A Public Involvement Plan, updated every 3 years, is one example.

7.4.1 Public Involvement and Outreach

The DOE Information Center is the repository for all publicly available material about DOE's programs at the Oak Ridge Office. The Information Center, located at 475 Oak Ridge Turnpike, is also the official repository for all information and documents that support or compose the administrative record for the FFA. This includes such information as newspaper articles related to the ORR, official correspondence, and decision documents on site remediations. It also contains documents requested under the

7.0 Outreach

Freedom of Information Act, newly released or declassified files and information dealing with health issues, and documents covering all aspects of the ORR's environment not otherwise part of the administrative record.

These file are accessible to the public and may be read on the premises, or the staff will copy documents on request. The Information Center's phone number is (865) 241-4780 or (800) 382-6938, Option 6.

DOE's Oak Ridge Public Affairs Office produces two publications distributed to interested individuals. The monthly *Public Involvement News* summarizes upcoming public meetings, announcements, availability of documents, pending NEPA actions, and opportunities for public involvement. *Cleanup Progress* is an annual report highlighting DOE's environmental management activities and decisions of the preceding fiscal year. It also fulfills the annual regulatory reporting requirement under the terms of the FFA. Individuals can be added to the DOE stakeholder mailing list by calling (865) 576-4006 or (800) 382-6938, Option 2. For information on all of DOE's Oak Ridge public affairs activities for programs in science, environmental management, and nuclear fuel supply, contact the DOE Public Affairs Office at (865) 576-0885 or (800) 382-6938, Option 1. For information on the National Nuclear Security Administration's Y-12 National Security Complex, contact NNSA Y-12 Site Office Public Affairs Office at (865) 576-9918.

Environmental management activities are also detailed on the Internet at <<http://www.oakridge.doe.gov/em>> and at <<http://www.bechteljacobs.com>>, which provides links to public documents, meeting and event calendars, and other information sources.

7.4.2 Oak Ridge Site Specific Advisory Board

The Oak Ridge Site Specific Advisory Board is an advisory committee to DOE's Environmental Management organization and is chartered under the Federal Advisory Committee Act of 1972.

The board provides advice to DOE's Oak Ridge Environmental Management program both on policy issues and on specific decision documents. The board consists of up to 20 members from the greater Oak Ridge region who are concerned about environmental restoration and waste management. Representatives from TDEC, DOE, and EPA Region 4 attend meetings as non-voting members to act as an information resource and hear concerns of the board. The board's standing committees are Environmental Management and Stewardship.

All board and committee meetings are open to the public and are announced in newspaper advertisements, in the Federal Register, at the DOE Information Center in Oak Ridge, and by calling (865) 576-1590 or (800) 382-6938, Option 4. Board meetings are recorded on video, and copies of the tapes are available for public review. The board produces a quarterly newsletter called "The Advocate," and its Web site is at

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<<http://www.oakridge.doe.gov/em/ssab/>>. Information is also available by calling the board's support office (see appendix).

7.4.3 National Environmental Policy Act of 1969

NEPA requires federal agencies to provide public officials and citizens with environmental information for proposed federal actions that could affect environmental quality. This is accomplished through the preparation of one of two documents: an environmental impact statement if the proposed action will have a significant impact on environmental quality, or an environmental assessment if the impact is not significant. The environmental impact statement requires public involvement and access to information regarding DOE proposals. Formal public meetings are held in conjunction with the scoping and release of an environmental impact statement, giving regulators and citizens an opportunity to comment openly on DOE's planned activities.

In 1994, DOE adopted a policy that combines the public involvement procedures of NEPA and CERCLA for major cleanup decisions. This policy states, "CERCLA documents will incorporate NEPA values, such as analysis of cumulative, off-site, ecological, and socioeconomic impacts, to the extent practicable." DOE's policy and announcements on pending NEPA actions are available on its web site at <<http://www.eh.doe.gov/nepa>>.

7.4.4 DOE Information Center

The DOE Information Center is the repository for all publicly available material about DOE's Oak Ridge operations. The Information Center, located at 475 Oak Ridge Turnpike, is also the official repository for all information and documents that support or compose the administrative record for the FFA. This includes such information as newspaper articles related to the ORR, official correspondence, and decision documents on site remediations. It is also the storage area for documents requested under the Freedom of Information Act, newly released or declassified files and information dealing with health issues, and documents covering all aspects of the ORR's environment not otherwise part of the administrative record.

These files are accessible to the public and may be read on the premises, or the staff will copy documents on request. The Information Center's phone number is (865) 241-4780.

Appendix

Local Government & Stakeholder Organizations

The Oak Ridge Reservation Local Oversight Committee, Inc.

Susan Gawarecki, Executive Director
102 Robertsville Road, Suite B
Oak Ridge, TN 37830
Phone: (865) 483-1333
Fax: (865) 482-6572
E-mail: loc@icx.net
Web site: <http://www.local-oversight.org>

City of Oak Ridge Environmental Quality Advisory Board

Ellen Smith, Chair
City of Oak Ridge, P.O. Box 1
Oak Ridge, TN 37831-0001
Phone: (865) 574-7396
Fax: (865) 425-3426
E-mail: EQAB@cortn.org
Web Site: <http://www.cortn.org/eqab/>

Roane County Environmental Review Board

Ed Strain, Chair
Roane County Courthouse
P.O. Box 643
Kingston, TN 37763
Phone: (865) 376-5287
Fax: (865) 717-4215
E-mail: edstrain@bellsouth.net

Oak Ridge Site Specific Advisory Board

Kerry Trammell, Chair
P.O. Box 2001, EM-90
Oak Ridge, TN 37831
Pete Osborne, Administrative Support
Phone: (865) 241-4583
Fax: (865) 574-3521
E-mail: OsbornePL@oro.doe.gov
Web Site: <http://www.oakridge.doe.gov/em/ssab/>

League of Women Voters of Oak Ridge

Robin Toth and Mary Uziel, Co-Presidents
P.O. Box 4073
Oak Ridge, TN 37831-4073
Phone: (865) 483-8005 (RT)
Phone: (865) 483-1043 (MU)
E-mail: lwvor@comcast.net
Web Site: <http://www.lwvor.com>

Community Reuse Organization of East Tennessee

Lawrence Young, President
107 Lea Way
P.O. Box 2110
Oak Ridge, TN 37831-2110
Phone: (865) 482-9890
Fax: (865) 482-9891
E-mail: younglt@croet.com
Web Site: <http://www.croet.com>

East Tennessee Environmental Business Association

Jenny Freeman, Executive Director
Grace Miller, Administrator
P.O. Box 5483
Oak Ridge, TN 37831-5483
Phone: (865) 483-9979
Fax: (865) 947-4788
E-mail: jenny@eteba.org
E-mail: grace@eteba.org
Web Site: <http://www.eteba.org>

Atomic Trades and Labor Council

P.O. Box 4068
Oak Ridge, TN 37831-4068
Phone: (865) 483-8471
Web Site: <http://www.atlunion.org/>

Paper, Allied-Industrial, Chemical, and Energy Workers International Union

Local 5-288
133 Raleigh Road
Oak Ridge, TN 37830
Phone: (865) 483-3745
Fax: (865) 483-6460
E-mail: pace@icx.net

Oak Ridge Reservation Health Effects Subcommittee

Marilyn Palmer, Designated Federal Official (DFO)
ATSDR/DHAC
1600 Clifton Road, NE (E-32)
Atlanta, GA 30333
Phone: (404) 498-1751
Fax: (404) 498-1744
email: myr4@cdc.gov
Web Site: <http://www.atsdr.cdc.gov/HAC/oakridge/>

Appendix

Coalition for a Healthy Environment

Harry Williams, President
12410 Buttermilk Road
Knoxville, TN 37932
Phone: (865) 693-7249
Fax: (865) 531-6217
E-mail: harry.williams2@comcast.net

Save Our Cumberland Mountains

P.O. Box 479
Lake City, TN 37769
Phone: (865) 426-9455
Fax: (865) 426-9289
E-mail: info@socm.org
Web Site: <http://www.socm.org>

Advocates for Oak Ridge Reservation

136 West Revere Circle
Oak Ridge, TN 37830
Phone: 865-483-0849
E-mail: aforr@discoveret.org
Web site: <http://www.discoveret.org/aforr/>

Oak Ridge Environmental Justice Committee

100 Wiltshire Drive
Oak Ridge, TN 37830-4505
Phone/Fax: (865) 482-1559
E-mail: brooks50@comcast.net
Web site:
<http://home.comcast.net/~brooks50/orejc.html>

State Contacts

Tennessee Department of Environment and Conservation

Department of Energy Oversight Division

761 Emory Valley Road
Oak Ridge, TN 37830
Phone: (865) 481-0995
Fax: (865) 482-1835
E-mail: John.Owsley@state.tn.us
Web site:
<http://www.state.tn.us/environment/doeo>

John Owsley

Director

Dale Rector

Assistant Director

Kristof Czartoryski

Waste Management

Jim Harless

Environmental Monitoring and Compliance

Doug McCoy

Environmental Restoration and FFA Manager

Charles Yard

Radiological Monitoring and Oversight

Tennessee Emergency Management Agency

Elgan Usrey

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3401 Sidco Drive
Nashville, TN 37204-1502
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Fax: (615) 242-9635
E-mail: eusrey@tnema.org
Web site: <http://www.tnema.org/>

Bob Roddy

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836 Louisville Road
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E-mail: broddy@tnema.org

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